# CONTENTS/SOMMAIRE

## ATHENS : PARISTECH, 8 of the 10 Engineering « Grandes Ecoles » and 15 European Institutions



**Web Address: http://www.athensprogramme.com**

# The ATHENS European Network and the «Semaine européenne»

# Le réseau européen ATHENS et la Semaine européenne

# Presentation and Objectives

Created in 1996, the ATHENS Network is composed of 15 european technological universities or institutions : the Universities and Technical Institutions of **BME** Budapest, **ITU** Istanbul, **TU D**elft, **KU L**euven, **IST** Lisbon, **UCL** Louvain-la-Neuve, **UP M**adrid, **Politecnico Milan, TU Munich**, **CTU** Prague, **AUTh** Thessaloniki**, NTNU** Trondheim, **TU Wien**, **Warsaw UT**, and 9 of the 11 institutes of **ParisTech** "Grandes Ecoles d'Ingénieurs de Paris », **(AGROPARISTECH, AGROPARISTECH/ENGREF, ENPC, ENSAM, ENSCP, Mines paris Tech, Telecom paris Tech, ENSTA, ESPCI).**

The principle goal of the Network is to facilitate the exchange of students, professors and researchers among the major European technological universities and to participate together under European technological development and training programmes.

One of the Network's first and most unique actions concerns the organisation of an intensive course programme given at each member institution during one of two defined periods ("Sessions") of the academic year (November and March). This training activity, called ATHENS (Advanced Technology Higher Education Network/SOCRATES).

Each Session, **includes both 30 hours of scientific courses work (see pages 22-24 for the courses offered) as well as 10-15 hours of "European Dimension" activities (see pages 6-7).** At the termination of an ATHENS Session, the Home Institution officially recognises the work carried out, according to the results obtained on an examination organised by the Host Institution and evaluated according to its proper system of grading. **Each complete Session is generally worth 2 to 3 ECTS credits.**

Though ATHENS is a relatively new SOCRATES activity this intensive course system is based on two successful past experiences :

- That of the ParisTech "Semaine Européenne", a 5-day long scientific intensive course programme set up between 1992 and 1999 among 9 of the 10 ParisTech institutions and under which some 1200 students annually participate in the intensive courses offered.

- That of the Leuven Network ERASMUS Programme: between 1990 and 1997, students from each institution were annually exchanged to follow an intensive course in the area of Telecommunications at a member institution. Over 150 students participated each year in this programme.

**ATHENS is an enlarged version of these two programmes**

The objective of the ATHENS Programme is that of giving students, coming from one Institution, the possibility of knowing another European pedagogical system. The Programme permits students, from different institutions to briefly integrate into courses of a high scientific level. When possible local students participate in these courses. This experience, in many cases, gives students the desire to carry out studies of a longer duration (Master or Phd level) at an institution different from their Home Institution and thus favours exchanges between students of the major European technological institutions.

The ATHENS Programme, was established with support of the European Communities SOCRATES Programme, receiving an annual subsidy of 50 000 Euros from 1997-2001. Today the Programme continues to be financed by the members institutions with the help of industrial partners and local authorities.

## Organisation and Registration for Courses

The list and characteristics of the various courses proposed for the ATHENS Session, March 14-21, are given in this brochure on pages 22-24.

**In order to participate in the Session, candidates are asked to do the following :**

- choose three or more possible courses in order of priority, taking into account the background knowledge (prerequisites) required in order to fully benefit from the course selected (additional information can be obtained from the professor organising the course, see the Course Description, and by consulting professors at the Home Institution).

- complete the Registration Form on the Web (found on either : http//www.athensprogramme.com or http://www.paristech.org and indicate, in addition to the course selected as a first choice, a " second choice course and third choice " in order to have a strong chance of participating in the Session. ParisTech students will be asked to complete up to six choices, depending on their institution.

- complete, print out and sign the Registration Form and the Commitment and return both forms to the International Office of your Home Institution. This Office is in charge of verifying that candidates have sufficient knowledge to follow the courses selected. They decide whether or not to propose a student for the Programme. You should also read “Things to Know about ATHENS”.

- take special note of the dates, hours and different European Dimension Programmes organised at each institution. As previously indicated, these programmes are an integral part of an ATHENS Session (further details are given on pages 6-7).

- **Attention.** Once you have received official acceptance for the ATHENS November 2008 Session, **your registration is considered as definite**. Only in the case of major unforeseen circumstances will Home Institutions permit their students to cancel registration. **Last minute cancellations can be costly: students can be asked to pay local expenses entailed by the course institution and the cost of housing reserved for them.**

- **According to your nationality, verify the visa requirements for the destinations you have chosen.**

The deadline for each ATHENS Member Institution to send each of the individual Registration Forms is

**Consult your local ATHENS Coordinator**

The official decision of Acceptance of Candidates for a course will be communicated to Member Institutions on

**FEBRUARY 11, 2009**

No charge is made to students to follow a course. Travel and Living costs are, however, the responsibility of the participating students and their Home Institution. See the section on Financial Conditions for more details.

## Housing, Travel and Living Costs for the 5 day courses and the European Dimension Programme

**Housing:**

Institutions organising courses will make the necessary housing arrangements for participating students who desire lodging during a Session (please complete the questions concerning this item on the ATHENS Application Form). Students should consult the chart on pages 13-17 to see the hotel dates which will be reserved at each institution. Housing and living costs will be kept to a minimum. As a result, students, requesting such local housing, must expect to find very "simple" forms of lodging. **Once reservations have been made for students in local housing, these reservations cannot be changed except for major reasons.**

**Travel:**

Travel costs, by bus, second class train or special reduced group flights costs from one institution to an other vary tremendously, with a trip from Lisbon to Trondheim being the most extreme example. ATHENS Home Institutions will assist students in finding the cheapest rate possible. Below are few examples:

| | |
|---|---|
| **Leuven-Paris-Leuven** | **99 Euros (train)** |
| **Delft-Louvain-Delft** | **89 Euros (train)** |
| **Madrid-Paris-Madrid** | **294 Euros** |
| **Madrid-Lisbon-Madrid** | **62 Euros** |
| **Paris-Lisbon-Paris** | **370 Euros** |
| **Paris-Trondheim-Paris** | **286 Euros** |
| **Paris-Budapest-Paris** | **335 Euros** |
| **Paris-Milan-Paris** | **230 Euros** |
| **Paris-Thessaloniki-Paris** | **283 Euros** |
| **Prague-Leuven-Prague** | **400 Euros** |
| **Thessalki-Prague-Thessaloniki** | **305 Euros** |
| **Thessalki-Brussels-Thessalki** | **270 Euros** |
| **Thessalki-Milan-Thessalki** | **253 Euros** |
| **Thessalki-Madrid-Thessalki** | **266 Euros** |

## European Dimension Activities

The purpose of these activities, organised to complement the course a student follows, is to permit ATHENS students to better know the course organising institution, its faculty, as well as the foreign European city where the course is held. **Of special importance is the possibility to mix with students of different nationalities and backgrounds during these European Dimension activities.**

Several types of activities take place:

- Visits to quarters and museums of the city or local area
- Visits to special exhibitions
- Concerts
- Informal activities and social events to permit visiting ATHENS students to meet with local students
- Student industrial forum to bring students into contact with the professional world

On the next page is a brief summary of the type of programme organised at each ATHENS site. Please take note of when these programmes begin and terminate. This information will be necessary for participating students in order to make their travel arrangements. A detailed programme for each site participating in the March 2009 Session will be available on the ATHENS Web site http://www.athensprogramme.com some nine days prior to the start of the Session.

# European Dimension

| SITE | PROGRAMME BEGINS | PROGRAMME TERMINATES | BRIEF DESCRIPTION OF PROGRAMME |
|---|---|---|---|
| **BUDAPEST** | 11:OO Saturday morning, March 14 | Saturday morning March 21 | Bus tour of city, Parliament & Castle area, Visit to the famous Szechenyi thermal Bath, Farewell buffet at BME |
| **DELFT** | 14:00 Saturday afternoon, March 14<br><br>*Students must arrive on Saturday morning | Friday night, March 20 | Welcome reception, Tour of Delft, dinner, farewell drinks and party |
| **ISTANBUL** | Saturday March 14 | Sunday morning March 22 | Sunday March 15 and Saturday March 21<br>Topkapı palace and museum, Ayasophia museum, Blue mosque, cistern, historical peninsula, grand bazaar, spice bazaar and ortaköy visits and a boat tour on the bosphorous |
| **KUL LEUVEN** | 19:00 Saturday late afternoon March 14 | Saturday morning, March 21 | Saturday optional visits in Leuven, Sunday excursion to historic city (Bruges, Ghent, Antwerp, Brussels…), evenings organised by Best Leuven. |
| **LOUVAIN LA NEUVE** | No Session organised in March | | |
| **LISBON** | 11:00 Saturday March 14 | Saturday afternoon, March 21 | Welcome meeting and lunch at IST Canteen. Visit to the new port of the City (Parque das Nações); Sunday visit to "Praça do Comércio", Tram ride though the ancient Lisbon (Historic area) visiting Lisbon's monuments and museums at "Belém". International café organised by NAPE. |
| **MADRID** | 22:00 Friday Welcome Party March 13 | Saturday morning, March 14 | Welcome Party with one drink. Welcome Reception with an informal lunch and visits to the old city of Madrid. Visit to the most important museums. Night walk with picnic and farewell party with one drink. |
| **TU MUNICH** | 13:00 Sunday, March 15 | Sunday morning, March 22 | Reception, visit to the German Museum, Opera Program, sight-seeing, TUM students organize a special trip at Saturday 22 (e.g. BMW Museum) |

| European Dimension | | | |
|---|---|---|---|
| **PARIS** | 11:00, Saturday morning, March 14 | Saturday morning, March 21 | Welcome-Reception, guided visits to special quarters of Paris and famous museums, a boat trip, Meeting with ParisTech students. Thursday evening FORUM with international companies (bring a cv). Final evening Party. |
| **PRAGUE** | 11:00 Saturday morning, March 14 | Saturday morning March 21 | Reception and informal visits to the old city of Prague, visit to museums and monuments, international evening "making friends", bus tour to see the Czech countryside, excursion |
| **POLITECNICO MILAN** | No Session organised in March | | |
| **TRONDHEIM NTNU** | No Session organised in March (due to surgery of Professor Sinding-Larsen) | | |
| **THESSALONIKI** | 10:00 Saturday morning, March 14 | Friday evening, March 20 | **Saturday:** Sightseeing-tour of Thessaloniki, visit to the Museums and the old Byzantine Churches. **Sunday:** Bus trip to Aiges (Vergina) (http://odysseus.culture.gr/h/3/eh351.jsp?obj_id=2362) and Dion (http://odysseus.culture.gr/h/3/eh351.jsp?obj_id=2508). For free entrance to museums students must show their student ID card. |
| **TU VIENNA** | 17:.00, Saturday, March 14 | Saturday Morning, March 21 | Welcome meeting, Vienna City Rallye, Technical Museum, movie evening, ERASMUS-night, evening at a "Heurigen-Restaurant", theatre and/or opera visit together with local student groups (BEST) |
| **WarsawUT** | Saturday afternoon March 14 | Saturday morning March 21 | Welcome reception, sightseeing tour of Warsaw Old Town, visiting Warsaw's monuments and museums, meetings with local students (WUT's Students Union), visiting students clubs etc. Detailed programme available later. |

**Financial Conditions for ATHENS Candidates**

The following figures listed below will give students an idea of "living expenses" involved in an ATHENS session. The costs are of three types:

- hostel costs (to be paid in cash, in the currency of the receiving country)
- lunch and evening meals
- social and cultural, "European Dimension" activities

**These costs are estimated as follows by the various institutions: (see pages 13-17)**

**Financial Aid for Participating students**

Interested ATHENS candidates should consult the international office at their Home Institution in order to obtain information on possible local bursaries or financial aid offered.

## Présentation et objectifs

Créé en novembre 1996, le réseau ATHENS se compose de 15 universités ou institutions technologiques européennes : **BME** Budapest, **ITU** Istanbul**, TU D**elft, **KU L**euven, **IST** Lisbon, **UCL** Louvain-La-Neuve, **UP M**adrid, **Polytecnico Milan**, **TU Munich**, **CTU** Prague, **AUTh** Thessaloniki, **NTNU** Trondheim, **TU Wien**, **Warsaw UT**, et de 9 des 11 Ecoles de **Paris Tech** « Grandes Ecoles d'Ingénieurs de Paris « **(AGROPARISTECH, AGROPARISTECH/ENGREF, ENPC, ENSAM, ENSCP, Mines Paris Tech, Telecom paris tech, ENSTA, ESPCI).**

Le réseau a pour objectif principal de faciliter les échanges d'étudiants, d'enseignants et de chercheurs entre les grandes universités technologiques européennes et de participer ensemble aux grands programmes européens de développement technologique et de formation.

Une des premières actions du réseau concerne la mise en place d'un programme de cours intensifs dispensés dans chaque institution membre durant une des deux périodes (sessions) définies de l'année universitaire (novembre et mars).

Cette activité de formation, dénommée sous le sigle ATHENS (Advanced Technology Higher Education Network/SOCRATES), s'inscrit dans le cadre du programme européen SOCRATES/ERASMUS.

Chacune des sessions **inclut 30 heures de cours scientifiques (voir pages 22 à 24 pour la liste des cours proposés) et 10 à 15 heures d'activités de « Dimension européenne » (voir pages 10-11)**.

A la fin de chacune des sessions, l'enseignement est validé par l'institution d'origine suivant le résultat obtenu au contrôle de connaissances organisé par l'institution d'accueil selon ses propres critères d'évaluation. **Chaque session complète équivaut généralement à 2 à 3 crédits ECTS**.
Ces programmes de cours intensifs, bien que relativement nouveaux, tirent parti de deux expériences passées réussies :

- celle de la « semaine européenne » de ParisTech. Cette activité d'échanges entre élèves de neuf des dix grandes écoles d'ingénieurs de Paris, débutée en 1992, draine chaque année de l'ordre de 1200 élèves ingénieurs qui suivent les enseignements organisés pendant une semaine de cours intensifs (30 heures de cours sur 5 jours) deux foix par an, en novembre et en mars.

- celle du « Leuven Network » dans le cadre de l'ancien programme ERASMUS, qui une fois par an, entre 1990 et 1997, a permis, chaque année, à 150 étudiants de ce réseau de suivre un cours intensif dans le domaine des télécommunications.

**Le programme intensif dit ATHENS est une version nouvelle et enrichie de ces deux actions.**

L'objectif recherché est de donner l'occasion aux étudiants provenant d'une autre institution de connaître un autre système pédagogique en s'intégrant brièvement à des enseignements de haut niveau scientifique suivis par des élèves d'établissements différents. Dans la mesure du possible, les étudiants de l'institution d'accueil suivent également ce cours. Cette expérience devrait susciter l'envie d'effectuer ultérieurement un séjour de plus longue durée (au niveau 3ème cycle notamment) dans une institution différente de l'institution de provenance de l'étudiant, et favoriser ainsi les échanges entre les élèves des grandes universités technologiques européennes.

Le programme intensif ATHENS fut établi avec le soutien de la Commission européenne dans le cadre du programme SOCRATES/ERASMUS qui lui a accordé entre 1997 et 2001 une subvention annuelle de 50 000 Euros. Aujourd'hui ATHENS continue à bénéficier du financement des institutions membres ainsi que de l'aide offerte par des entreprises et des autorités locales.

## Organisation et modalités d'inscription

La liste et les caractéristiques des différents cours proposés, pour la session ATHENS du 14 au 21 mars 2009, sont données dans le présent fascicule aux pages 22- 24.

**Pour participer à la semaine, il convient :**

- d'effectuer le choix de trois de ces cours, en tenant compte en particulier des "connaissances préalables requises" pour pouvoir suivre avec profit le cours envisagé (des renseignements complémentaires peuvent être obtenus auprès du responsable du cours).

- de remplir le formulaire d'inscription sur Web (dont le modèle se trouve soit à http://www.paristech.org, soit à http://www.athensprogramme.com) en indiquant, en plus de votre choix principal de cours, un second et troisième choix dans l'éventualité d'un manque de places disponibles dans le cours du premier choix (de cette façon un candidat augmente ses chances d'acceptation). Les étudiants de ParisTech seront invités à faire jusqu'à six choix selon leur institution d'origine.

- de signer le formulaire ainsi que l'Engagement et regarder « Things to Know about ATHENS ».

- de remettre le formulaire rempli à la direction des études de votre établissement, laquelle se chargera de confirmer ou modifier les choix d'un étudiant avant de proposer sa candidature au programme ATHENS.

- bien noter les dates et heures du programme de Dimension Européenne organisé par l'Institution où vous suivrez votre Session. Ainsi que nous l'avons souligné plus haut, ce programme fait partie intégrante d'une session ATHENS (**détails pages 10-12**)

- **ATTENTION : dès reception de votre confirmation officielle vous serez définitivement inscrit pour suivre la Session ATHENS de mars 2009**. Seul un cas de force majeure ou des circonstances exceptionnelles permettront aux responsables locaux de donner leur approbation pour annuler cette inscription. **Une annulation de dernière minute coûte cher :** il pourra être demandé à l'étudiant de payer les frais engagés par l'institution d'accueil ainsi que le paiement du logement qu'on lui aura réservé, si son annulation n'est pas valablement justifiée.

- **suivant votre nationalité, bien vérifier des formalités de visa à accomplir pour les différentes destinations choisies**.

La date limite de renvoi de la fiche individuelle de demande d'inscription par l'établissement d'origine est le :

**Voir au niveau de votre institution**

La décision d'acceptation de l'inscription sera communiquée le :

**11 février 2009**

La participation au cours ne comporte pas de frais d'inscription. Les frais de voyage et de séjour sont à la charge des étudiants (éventuellement aidés par leur établissement d'origine).

# Logement, Voyage et Frais de Séjour (cinq jours de cours, plus le programme de Dimension Européenne)

**Logement :**

Les institutions proposent les cours, organisent l'hébergement des étudiants désireux de se loger durant la session (merci de compléter les rubriques concernées dans la fiche d'inscription). Les étudiants sont invités à consulter le tableau (pages 13-17) afin de connaître les dates d'hôtel retenues par chaque institution. Les frais d'hébergement et de séjour seront réduits au minimum. Ce qui implique que les étudiants, qui s'engagent dans ces conditions, doivent s'attendre à un logement sommaire.

Par ailleurs une fois que la réservation est faite, aucun désistement ne sera accepté sauf pour des **raisons majeures.**

**Voyage :**

Les frais de voyage varient considérablement d'une destination à l'autre, le coût de la liaison entre Lisbonne et Trondheim donnant un exemple du trajet le plus cher. Chaque établissement propose à ses étudiants le tarif de transport le plus avantageux. A titre d'exemple, nous pouvons citer les destinations suivantes et les prix de l'ordre de :

| | |
|---|---|
| **Leuven-Paris-Leuven** | **99 Euros (train)** |
| **Delft-Louvain-Delft** | **89 Euros (train)** |
| **Madrid-Paris-Madrid** | **294 Euros** |
| **Madrid-Lisbon-Madrid** | **62 Euros** |
| **Paris-Lisbonne-Paris** | **370 Euros** |
| **Paris-Trondheim-Paris** | **286 Euros** |
| **Paris-Budapest-Paris** | **335 Euros** |
| **Paris-Milan-Paris** | **230 Euros** |
| **Paris-Salonique-Paris** | **283Euros** |
| **Prague-Leuven-Prague** | **400 Euros** |
| **Salonique-Prague-Salonique** | **305 Euros** |
| **Salonique-Bruxelles-Salonique** | **270 Euros** |
| **Salonique-Milan-Salonique** | **253 Euros** |
| **Salonique-Madrid-Salonique** | **266 Euros** |

## Activités de dimension européenne :

**Le but de ces activités, organisées en complément des cours, est de permettre à l'étudiant ATHENS de mieux connaître l'institution qui l'accueille, ainsi que la ville européenne dans laquelle il se trouve**. Une importance particulière est donnée à l'opportunité qui est fournie aux étudiants ATHENS de pouvoir s'intégrer à un groupe mixte d'étudiants de nationalités et formations différentes, au cours de ces activités de dimension européenne.

**Plusieurs activités sont proposées:**

- Visite des quartiers et de Musées de la ville et des alentours
- Visites d'expositions temporaires ou permanentes
- Concerts
- Activités informelles et événements sociaux pour permettre aux étudiants visiteurs ATHENS de rencontrer les étudiants locaux.
- Forum industriel pour une prise de contact des étudiants avec le monde professionnel

Ci-après, un résumé succinct du type de programme organisé par chaque site ATHENS. **Veuillez noter les horaires et dates du début et de la fin du programme culturel vous concernant. Ces informations sont décisives pour décider de votre calendrier de voyage.** Un programme culturel détaillé pour chacun des sites participants à la session de mars 2009 sera disponible sur le site Web (http://www.athensprogramme.com) , dix jours avant le début de la session.

# Dimension Européenne

| SITE | Debut du PROGRAMME | Fin du PROGRAMME | DESCRIPTION |
|---|---|---|---|
| **BUDAPEST** | 11:OO Samedi matin 14 mars | Samedi matin 21 mars | Visite de la ville en bus, Parlement et château, visite des célèbres thermes Szechenyi, buffet d'adieu à BME. |
| **DELFT** | 14 :00 Samedi après-midi 14 mars<br>*les étudiants doivent arriver le samedi matin | Vendredi soir 20 mars | Réception d'accueil, tour de la ville de Delft, dîner, soirée d'adieu. |
| **ISTANBUL** | Samedi 14 mars | Dimanche matin 22 mars | Dimanche 15 mars et Samedi 21 mars: Palais et musée Topkapi, Musée Ayasophia, Mosquée bleue, citerne, péninsule historique, grand bazaar, bazaar aux épices et visite à Ortaköy. Promenade en bateau sur le Bosphore. |
| **KU LEUVEN** | 19 :00 samedi 14 mars | samedi matin 21 mars | Samedi : visites en option à Leuven<br>Dimanche : Excursion aux cités historiques de bruges, Gand, Anvers, Bruxelles…<br>Soirée(s) organisée(s) par BEST Leuven. |
| **LOUVAIN LA NEUVE** | Pas de session en mars. | | |
| **LISBONNE** | 11 :00 Samedi 14 mars | Samedi après-midi 21 mars | Réception-Accueil et déjeuner au restaurant de l'IST. Visite du nouveau port (Parque das Nações); Dimanche visite à "Praça do Comércio", Excursion en tramway dans le vieux Lisbonne (zone historique) avec visite des monuments et musées à "Belém". Café international organisé par NAPE. |
| **MADRID** | 22:00 vendredi 13 mars, Soirée de bienvenue | Samedi matin 14 mars | Soirée de bienvenue avec une boisson. Réception samedi matin avecdéjeuner informel. Visites de la vieille ville de Madrid, des musées les plus importants, monuments spéciaux, promenade nocturne avec pique-nique, soirée d'adieu avec une boisson. |
| **POLITECNICO MILAN** | Pas de session en mars | | |
| **TU MUNICH** | 13:00 dimanche 15 mars | Dimanche matin 22 mars | Réception, visite guidée de Munich, visite du musée allemand, Programme à l'Opéra, excursion le samedi 22 mars organisée par les étudiants de TUM (peut-être au musée BMW) |
| **PARIS** | 11:OO, Samedi matin, 14 mars | Samedi matin 21 mars | Réception-Accueil Visites guidées des quartiers de Paris, de musées renommés, Promenade en bateau-mouche. Rencontres avec les étudiants de ParisTech. Jeudi soir FORUM avec des entreprises internationales (Apporter CV). Dernier jour :Soirée d'adieu |

| | | | |
|---|---|---|---|
| **PRAGUE** | 11:.00 Samedi matin 14 mars | Samedi matin 21 mars | Réception et visites informelles de la vieille ville de Prague. Visite des musées et monuments, soirée internationale pour "se faire des amis". Visites en car. |
| **NTNU TRONDHEIM** | Pas de session en novembre (intervention chirurgicale du Professeur) | | |
| **AUT THESSALONIKI** | 10:00 Samedi matin 14 mars | Vendredi soir 20 mars | **Samedi** : Visite de la ville de Salonique, des musées et des églises byzantines **Dimanche** : Excursion en car à Aiges (Vergina) (http://odysseus.culture.gr/h/3/eh351.jsp?obj_id=2362) and Dion (http://odysseus.culture.gr/h/3/eh351.jsp?obj_id=2508). (carte d'étudiant nécessaire pour une entrée gratuite) |
| **TU VIENNA** | 17:00 Samedi 14 mars | Matin Samedi 21 mars | Réception, Tour de la ville de Vienne, nuit ERASMUS, musée technique, soirée au restaurant « Heurigen », Visite d'un théâtre ou de l'Opéra avec les étudiants locaux de BEST. |
| **WARSAW UT** | Samedi après-midi 14 mars | Samedi matin 21 mars | Réception, suivie d'une visite du vieux Varsovie. Visite des monuments et musées de la ville. Rencontre avec les étudiants de WUT (Best), Clubs d'étudiants etc. Programme détaillé ultérieurement. |

## Conditions financières d'une session ATHENS

**Frais de séjour pour une session ATHENS :**

- hôtel, (qui doit être payé en espèces dans la monnaie du pays d'accueil)
- repas de midi et du soir,
- activités socio-culturelles à dimension européenne.

**Ces coûts sont estimés de la manière suivante : (voir pages 13-17)**

**Financements offerts aux étudiants participants :**

Les candidats ATHENS intéressés par cette possibilité sont invités à prendre contact avec le bureau international de leur institution d'origine afin d'obtenir les renseignements sur des bourses ou des aides offertes.

## HOTEL RESERVATION DATES & COSTS AT EACH SITE
## DATES DE RESERVATION DES HOTELS ET COUTS A CHAQUE SITE

| SITE | BED & BREAKFAST | 2 MEALS A DAY | LOCAL TRANSPORTATION | EUROPEAN DIMENSION ACTIVITIES |
|---|---|---|---|---|
| ***Stay A**** ***(8 nights)*** | **From Friday 13/3 evening to Saturday 21/3 morning** | **14 Meals** | | |
| ***Stay B**** ***(8 nights)*** | **From Friday 13/3 evening to Saturday 21/3 afternoon** | 15 MEALS | | |
| ***Stay C**** **(8 nights)** | **From Saturday 14/3 evening to Sunday 22/3 morning** | **15 Meals** | | |
| ***STAY D**** ***(7 nights)*** | **From Saturday 14/3 evening to Saturday 21/3 morning** | **13 Meals** | | |
| ***STAY E**** ***(7 nights)*** | **From Friday 13/3 evening to Friday 20/3 late afternoon** | **13 Meals** | | |
| **BUDAPEST** | **STAY A*** For 8 nights : **140 Euros** | 4 meals for free / **5 Euros per economical meal.** | **Local transport pass is included in the cultural fee Airport transfers : 20 Euros** | **60 Euros**/ 6 hour long guided bus tour/ thermal bath/ boat trip & lunch on the Danube/ local transport pass |
| **DELFT** | **From Saturday 14/3afternoon to Saturday 21/3 morning STAY E*** 7 nights, **192,50 Euros** *Students must arrive on Saturday morning | Lunches & evening meals : **55 Euros** // individual meal = **5 Euros** on Campus | Airport to accommodation, 8 Euros. One way/Strippenkaart bus, tram, metro 6,70 Euros | **Free** |
| **ISTANBUL** | **STAY C* 8 nights** Accommodation: **56 €** youth hostel in Taksim square: 7 Euro per night per student X 8 nights excluding break-fast in a hostel room of 8 people. (sharing bathroom) | **3 MEALS A DAY** Meals: **119 €** 3 **€ b**reakfast x8= 24 **€** 10 **€** dinner x 8 nights=80 **€** Lunch 5 **€**x 3 days= 15 **€** (Free lunch for 5 day during lectures.) | Transportation: **30 Euro** 25 **€** for the week + 5 **€** Airport transfer (from Atatürk International Airport) | **70 Euros** Includes all activities listed on Saturday and Sunday. (2 lunches 1 1 dinner bus transportation and English speaking provided) |
| **LEUVEN** | **STAY D* 7 nights** For a total of **120 EUROS** | **A total of 80 Euros** | **A total of 10 Euros** | **Free** |
| **LISBON** | **STAY B* 8 nights x 17.50 = 140 Euros** | Individual meal **2,20 Euros** on Campus (lunches & evening meals) | 5 days transportation (unlimited pass) : **15 Euros** | **Around 52 Euros** (Includes all Activities & lunch on Saturday and Sunday ) |
| **LOUVAIN** | **STAY D***7 nights = **250-300 Euros** | **10 Euros per day** in University canteen | **15 Euros** | **Free** |

## HOTEL RESERVATION DATES & COSTS AT EACH SITE Continued
## DATES DE RESERVATION DES HOTELS ET COUTS A CHAQUE SITE Suite

| SITE | BED & BREAKFAST | 2 MEALS A DAY | LOCAL TRANSPORTATION | E. D. ACTIVIT |
|---|---|---|---|---|
| **MADRID** | **STAY A* 8 nights**<br>18 Euros per night<br>= **144 Euros** | **12 Euros per day** | **A total of 20 Euros** | **20 Euros** |
| **MUNICH** | **7 nights,**<br>**Sunday 15th –Sunday 22nd**<br>6-8 bedrooms, 23,50 € per night incl. breakfast,<br>**164,50 €** total | **ca.5,50 € per meal**<br>+ a drink at the University canteen | Metro/Tram:<br>Card/single 2,30 €<br>Card/week 11,50 € (2 rings)<br>Card/week 13,80 € (3 rings) | **30 Euros** |
| **PARIS** | **STAY A* 8 nights**<br>**223,20 Euros** | **77 Euros** for<br>7 days<br>(2 meals included) | Unlimited travel : a total of **30 Euros** in Paris / **39 Euros** for students going to ENPC | **25 Euros** |
| **PRAGUE** | **STAY A* 8 nights 128 Euros (16 Euros per night)** | **A total of 60 Euros** | **A total of 25 Euros** | **40 Euros** |
| **THESSALONIKI** | **STAY A* in 3* hotel 8 nights 216 € (27 € per night in 3 bed room) or 240 € (30 € per night in 2 bed room). Price includes breakfast and free WiFi access** | **Total 9 €for 5 days (from Monday to Friday) in the University Student Restaurant (1,8 € /day). To be paid together with the ED activities' expenses. Meal in the city restaurants about 10 €** | **City bus tickets cost 0,50 € regular and 0,25 for students. Valid for 70 Minutes. Taxi from Airport to city centre about 15 €** | **30 Euros** |
| **TRONDHEIM** | **STAY C* 8 nights**<br>**25 Euros**<br>**per night = 200 Euros** | **6 Euros for dinner** | no transportation necessary | **20 Euros** |
| **TUVIENNA** | **STAY D* 7 nights**<br>**20,5 Euros, per night**<br>**(= max. 143,5 Euros, in total)** | **4,20 Euros**-/lunch (student restaurant) | Airport-bus: **8 Euros,-**<br>Card/Week: **14,00 Euros**<br>Card/Single: **1,70 Euros** | **25 Euros** |
| **WUT WARSAW** | **STAY D* 7 nights**<br>**20 € per night (double room) in a students' hostel - - about 140 €**<br>breakfast – **4 €** (total **28 €**) | **5 €** - lunch in WUT's Canteen<br>**10 - 15 €**<br>in Restaurants | One week unlimited ticket – **10 €**<br>Single ticket – **0,80 €** | **approx. 25 Euros** |
| **LECCO POLITECNICO** | **B*** Sat. to Sat.<br>7 nights (2 nights in Milano and 5 in Lecco)<br><br>**180€** | 1 meal on campus in University Canteen (only Lunch)<br>About 6.50€<br><br>Dinner, minimum cost 12€ per meal | In Milan: 1 ticket costs €1<br>A 48-hour ticket costs €5.50<br>Ticket to the fair: 3.00€ (round ticket)<br>Trains Milano – Lecco: € 7.50 (round trip)<br>**Airport transfer** From Malpensa:Malpensa express to Cadorna Station=11 €<br>Malpensa Shuttle Air Pullman to Central Station=5.00 € /<br>From Linate: Bus 73 to S. Babila= 1€ | **34.50 Eu** |

## HOTEL RESERVATION DATES & COSTS AT EACH SITE Continued
## DATES DE RESERVATION DES HOTELS ET COUTS A CHAQUE SITE Suite

| SITE | BED & BREAKFAST | 2 MEALS A DAY | LOCAL TRANSPORTATION | E. D. ACTIVIT |
|---|---|---|---|---|
| **MILAN POLITECNICO** | **B* Sat. to Sat. 7 nights 140€** | 1 meal on campus in University Canteen (only Lunch) About 6.50€ Dinner, minimum cost 12€ per meal | In Milan: 1 ticket costs 1€ A 48-hour ticket costs 5.50€ Ticket to the fair: 3.00€ (round ticket)<br><br>Airport transfer From Malpensa: Malpensa express to Cadorna Station=11 € Malpensa Shuttle Air Pullman to Central Station=5.00 € / From Linate: Bus 73 to S. Babila= 1€ | **27 Euros** |
| **PIACENZA POLITECNICO** | **C* Sat. to Sun. 8 nights**<br><br>**160€**<br><br>**Bath towels not included In the price. If you want the hotel to provide them there is an extra to pay** | 1 meal around (only Lunch) About 6.50€<br><br>Dinner, minimum cost 12€ per meal | Trains Milano – Piacenza: 10.00€ (round trip) In Piacenza: 1 ticket costs €1; a 8-trip ticket costs 7<br><br>Airport transfer From Malpensa:Malpensa express to Cadorna Station=11 € Malpensa Shuttle Air Pullman to Central Station=5.00 € / From Linate: Bus 73 to S. Babila and then Central Station = 1€ In Milan: 1 ticket costs 1€ | **Euros 27** |

| SITE | TOTAL COSTS<br>For 5-day Course and the European Dimension Programme (includes housing, meals, local transportation, European Dimension Programme) |
|---|---|
| BUDAPEST | *200 EUROS*<br>**8 days, 8 nights** |
| DELFT | *280 EUROS*<br>**7 days, 7 nights** |
| ISTANBUL | *275 EUROS*<br>**8 days, 8 nights** |
| LEUVEN | *230 EUROS*<br>**8 days, 7 nights** |
| LISBON | *240 EUROS*<br>***8 days, 8 nights*** |
| LOUVAIN | *300-370 EUROS*<br>**8 days, 7 nights** |
| *MADRID* | *280 EUROS*<br>***8 days, 8 nights*** |
| LECCO (POLITECNICO) | *273 EUROS*<br>**8 days, 7 nights**<br>Transportations not included |
| MILANO (POLITECNICO) | *273 EUROS*<br>**8 days, 7 nights**<br>Transportations not included |
| PIACENZA (POLITECNICO) | *297 EUROS*<br>**8 days, 8 nights**<br>Transportations not included |
| MUNICH | *212 EUROS*<br>***8 days, 8 nights*** |

| SITE | **TOTAL COSTS continued**<br>**For 5-day Course and the European Dimension Programme (includes housing, meals, local transportation, European Dimension Programme)** |
|---|---|
| ***PARIS*** | **330-400 EUROS**<br>**8 days, 7 nights**<br>**Not included : Transportation from airport** |
| ***PRAGUE*** | **253 EUROS**<br>**8 days, 8 nights** |
| ***THESSALONIKI*** | **255/279 Euro**<br>**8 days, 8 nights**<br>**Not Included: Transportation, meals during the ED**<br>**No insurance is provided by AUTh (contact your local insurance company for a travel insurance)** |
| ***TRONDHEIM*** | **350,50 EUROS**<br>**8 days, 9 nights** |
| ***VIENNA*** | **260 EUROS**<br>**7 days, 7 nights** |
| ***WARSAW*** | **240-300 EUROS**<br>**7 days, 7 nights** |

# List of ATHENS Institutions
# Liste des institutions ATHENS

| | | |
|---|---|---|
| BUDAPEST | **BME : BUDAPEST : Budapest University of Technology and Economics**<br>H-1111. Budapest, M Egyetem rkp.3 – H-1111 Budapest, Hungary<br>Contact : P. MOSON, Tel. +36 1 463 3561, Mob. +36 30 9329626 – Fax : +36 1-46 31291<br>Email : **moson@bme-tk.bme.hu** | Page 176 |
| DELFT | **DELFT : Delft University of Technology**<br>TU Delft, Jaffalaan 9a, 2628 BX, Delft - The Netherlands<br>Contact: Ms.Renée Aggenbach / Ms. Patricia Carrion-Gordon<br>Tel : + 31 15 27 880 12; - Fax : +31 15 27 856 90<br>E-mail : **internationoffice@tudeft.nl** | Page 182 |
| ISTANBUL | **ITU: ISTANBUL: Istanbul Technical University**<br>Istanbul Teknik Üniversitesi Ayazaga Kampüsü, Rektörlük Binası Uluslararası İlişkiler Ofisi<br>Maslak Istanbul, Turkey<br>Contact : Defne KORUR, Tel+ Fax : +90 212 2853074<br>**Email : defne.korur@itu.edu.tr** | Page 178 |
| LEUVEN | **KUL : Katholieke Universiteit Leuven, Faculty of Engineering**<br>Katholieke Universiteit Leuven, Faculty of Engineering, Decanaat,<br>Kasteelpark Arenberg 1- bus 220 0, 3001 Heverlee, Belgium<br>Contact : Ms. Anouck BROUWERS, Tel : + 3216321202 - Fax : +3216321982<br>E-mail : **anouck.brouwers@eng.kuleuven.be** | Page 179 |
| LOUVAIN | **UCL : Université Catholique de Louvain**<br>UCL Louvain, 3, place du Levant ou 1 Rue Archimede, Belgium 1348 Louvain-la-Neuve<br>Contact : P. MERTES, Tel : + 32 1 0472464- Fax : +32 1 0472466,<br>E-mail : **mertes@sfsa.ucl.ac.be** | Page 185 |
| LISBOA | **IST : Instituto Superior Técnico Lisboa**<br>IST,GRI, Av Rovisco Pais, 1049-001 Lisboa, Portugal<br>Contacts : Silvia SANTOS, Tel : + 351 21 841 9545- Fax : +351 21 841 9280<br>E-mail : **silvia.santos@ist.utl.pt** ;<br>Paula Cunha , Tel : + 351 21 841 7362- Fax : +351 21 841 9280<br>E-mail : **paula.cunha@ist.utl.pt** | Page 177 |
| MADRID | **UPM : Universidad Politecnica de Madrid**<br>UPM, Ramiro de Maeztu 7, 28040 Madrid, Spain<br>Contacts : Isabel ARRIBAS, Tel : + 34 9 1 336 6168 (from 15h to 20h)- Fax : +34 91336 3664<br>E-mails : **isabel.arribas@upm.es** | Page 186 |
| MILAN | **MILAN : Politecnico di Milano**<br>Servizio Progetti Internazionali, Politecnico di Milano,<br>piazza Leonardo da Vinci 32, I 20133 Milano, Italy<br>Contact : Francesca FOGAL<br>Tel : +39 02 2399 9763- Fax : + 39 02 23 99 9762- Email : Progetti.doubledegrees@polimi.it<br>Michela Gregori Tel. +39 02 2399 9733 – Fax : +39 02 2399 9762 Email :<br>Email :**Michela.gregori@polimi.it** | Page 181 |

# List of ATHENS Institutions (Continued)
# Liste des institutions ATHENS (Suite)

| | | |
|---|---|---|
| MUNICH | **MUNICH: Technical University of Munich**<br>Lehrstuhl für Baumechanik, Technische Universität München<br>Contact: Professor Gerhard MÜLLER, Karen ARLT<br>Sekretariat, Arcisstraße 21, D-80333 München<br>Tel: +49 (0)89 289-28345- fax +49 (0)89 289-28665<br>Email: karen.arlt@bv.tum.de **http://www.bm.bv.tum.de** | Page 183 |
| PARIS | **ParisTech : Institut des Sciences et Technologies**<br>46, Rue Barrault, 75634 Paris Cédex 13<br>Contacts L. DAGONNEAU,-Tel : + 33 1 45 81 75 30- Fax : +33 1 45 88 11 14<br>**E-mail :liliane.dagonneau@paristech.fr** | |
| | **AGRO PARISTECH**<br>16, rue Claude Bernard, 75231 Paris Cédex 05<br>Contact : A. HOLL-NICAUD, Tel : + 33 1 44 08 16 20- Fax : +33 1 40 08 17 00<br>E-mail : **Agnes.Holl-Nicaud@agroparistech.fr** | Page 187 |
| | **AGROPARISTECH/ENGREF**<br>19 Avenue du Maine, 75732 Paris Cédex 15<br>Contacts : M.F. SOUCI Tel : +33 1 45 49 89 61- Fax : +33 1 45 49 88 27,<br>or Didier FLORES +33 1 45 49 89 65 - Fax : +33 1 45 49 88 27<br>E-mail : souci@engref.fr, flores@engref.fr | |
| | **ENPC : Ecole des Ponts ParisTech**<br>6 & 8 Av Blaise Pascal, Cité Descartes, Champs/Marne, 77455 Marne la Vallée Cédex 2<br>Fabien PARIS Tel : + 33 1 64 15 39 44- Fax : +33 1 64 15 39 49<br>E-mail : **fabien.paris@enpc.fr** | Page 187 |
| | **ENSAM : Ecole Nationale Supérieure d'Arts et Métiers**<br>151 Boulevard de l'Hôpital, 75013 Paris<br>Contacts : F. MASSOUH Tel : + 33 1 44 24 62 56- Fax : +33 1 44 24 62 66<br>E-mail : **fawaz.massouh@paris.ensam.fr** | Page 188 |
| | **ENSCP : Ecole Nationale Supérieure de Chimie de Paris**<br>11, rue Pierre & Marie Curie, 75231 Paris Cédex 05<br>Contacts : G. COTE, Tel : +33 1 44 27 67 60 - Fax : + 33 1 43 25 18 76<br>E-mail : gerard-cote@enscp.fr, C. MONJARDET : **christine-monjardet@enscp.fr** | Page 188 |
| | **MP : Mines ParisTech**<br>60, boulevard Saint-Michel<br>75272 Paris Cédex 06<br>Contacts P. BALADI, Tel : +33 1 40 51 90 81 - Fax : + 33 1 40 51 90 98<br>E-mail : **pierre.baladi@ensmp.fr** | Page 190 |
| | **TELECOM ParisTech (TPT)**<br>46, rue Barrault, 75634 Paris Cédex 13<br>Contact : J. CAHORS, Tel : + 33 1 45 81 79 96 - Fax : +33 1 45 88 11 14<br>E-mail : jerome.cahors@telecom-paristech.fr | Page 190 |
| | **ENSTA : Ecole Nationale Supérieure des Techniques Avancées**<br>32 boulevard Victor, 75739 Paris Cédex 15<br>Contact : M. MINDER, J. BOHDANOWICZ, Tél : +33 1 45 52 56 23 + 01 45 52 44 24<br>Fax : +33 1 45 52 54 93 E-mail : **myriam.minder@ensta.fr**, Julien.Bohdanowicz@ensta.fr, | Page 189 |
| | **ESPCI : Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris**<br>10, rue Vauquelin, 75231 Paris Cédex 05<br>Contact : A. JARDY, Tel : + 33 1 40 79 44 16- Fax : +33 1 40 79 47 76<br>E-mail : alain.jardy@espci.fr<br>P. ROUSSEL, Tel : + 33 1 40 79 44 63- Fax : +33 1 40 79 44 25 E-mail : **pierre.roussel@espci.fr** | Page 189 |

# List of ATHENS Institutions (Continued)
# Liste des institutions ATHENS (suite)

| | | |
|---|---|---|
| PRAGUE | **CTU : Czech Technical University in Prague**<br>International Office, Czech Technical University in Prague<br>Zikova 4, CZ - 166 35 Prague 6<br>Contact : Jan POZAR<br>Tel : +420 2 2435 3465 - Fax: : +420 2 2435 3491<br>E-mail: **Pozar@vc.cvut.cz** | Page 187 |
| THESSALONIKI | **AUT : Aristotle University of Thessaloniki**<br>Institute of Steel Structures<br>Faculty of Engineering<br>GR-541 24 Thessaloniki, Greece<br>Contact : Aris Avdelas, professor Tel. +30 2310 995784/Fax. +30 2310 995642/<br>email: **avdelas@civil.auth.gr** http://www.auth.gr/home/index_en.html | Page 189 |
| TRONDHEIM | **NTNU : Norwegian University of Science and Technology**<br>Hogskoleringen 1, 7034 Trondheim, Norvège- Contact : W. LASCHET,<br>Tel : + 47 7 3595240- Fax : +47 7 3595210 - E-mail : **international@adm.ntnu.no** | Page 190 |
| VIENNA | **TUW: Vienna University of Technology (Wien)**<br>International Office (Ausseninstitut), Gusshausstrasse 28, 1040 Wien<br>Contact: Andreas ZEMANN,<br>Tel. +43 1 58801 41552, Fax. +43 1 58801 41599. **Zemann@ai.tuwien.ac.at,**<br>Web site :www.tuwien.ac.at/ai | Page 191 |
| WARSAW | **WUT: Warsaw University of Technology**<br>Pl. Politechniki 1, 00-661 Warszawa<br>Centre for International Cooperation<br>Contact: Dominika Frąk – Dudzińska<br>Tel. +48 22 234 7185, +48 22 629 59 68 **Fax.** +48 22 234 57 77<br>Email: d.frak@cwm.pw.edu.pl.<br><br>Second Contact: Marek Polak, PhD, Director<br>**Tel.** +48 22 234 7185, +48 22 629 59 68 **Fax.** +48 22 234 57 77<br>E-mail: mpolak@cwm.pw.edu.pl | Page 191 |

# ATHENS Intensive Courses

# Cours de la semaine européenne

# Summary Table of Courses /Sommaire des cours

| CODE | COURSES | Lang. (*) | Page |
|---|---|---|---|
| **TPT19** | Digital design : objects in progress | **E** | **161** |
| **TPT22** | Atelier de mise en théâtre du Web | **F** | **163** |
| **TPT23** | Digital Signal Processing, case studies | **E** | **165** |
| **TPT24** | Web search | **E** | **167** |

* Langue/Language : E=English ; F=Français ; S=Spanish

| | |
|---|---|
| **Course code** | AUTH1 |
| **Course title** | Genetic algorithms and related biological metaphors in Engineering |
| **Institution** | Aristotle University of Thessaloniki |
| **Course address** | Faculty of Engineering, Aristotle University of Thessaloniki, Department of Rural and Surveying Engineering |
| **City** | Thessaloniki, Greece |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | genetic algorithm, optimization, evolutionary methods, particle swarm optimization, differential evolution. |
| **Language** | English |
| **Professor responsible** | Epaminondas SIDIROPOULOS |
| **Telephone** | +30 2310 996143 |
| **Fax** | +30 2310 996143 |
| **Email** | nontas@topo.auth.gr |
| **Participating professors** | Epaminondas SIDIROPOULOS, Chris EVANGELIDES |
| **Number of places** | Minimum: 8, Maximum: 20, Reserved for local students: 5 |
| **Objectives** | The course aims at exposing basic principles of genetic algorithms and related biologically inspired methods employed as optimization tools. Computational aspects will be emphasized in the context of specific selected problems. |
| **Programme to be followed** | The topics to be addressed are:<br>Elements of optimization theory and methods<br>Introduction to biologically inspired computations<br>Genetic algorithm description, mechanics and elementary examples<br>Application of genetic algorithms to problems of combinatorial optimization such as the travelling salesman problem and location problems<br>Hybridization of genetic algorithms with conventional optimization methods<br>Particle swarm optimization method and its hybridization with genetic algorithms.<br>Differential evolution.<br>Computational exercises will be performed in class using the Mathematica software. Problems of engineering interest will be treated. |
| **Prerequisites** | Good knowledge and facility in a computer language such as BASIC or FORTRAN |
| **Course exam** | Question quiz on the last day of the course and a set of computational exercises to be submitted after |

the end of the course.

| | |
|---|---|
| **Course code** | AUTH2 |
| **Course title** | Impact of Metro construction on the long term sustainability of a Metropolitan city: The case of Thessaloniki |
| **Institution** | Aristotle University of Thessaloniki |
| **Course address** | Faculty of Engineering, Aristotle University of Thessaloniki, Department of Civil Engineering |
| **City** | Thessaloniki, Greece |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | **Metro systems, sustainability, construction, building environment** |
| **Language** | English |
| **Professor responsible** | Aris Avdelas |
| **Telephone** | + 30 2310 995784 |
| **Fax** | + 30 2310 995642 |
| **Email** | avdelas@civil.auth.gr |
| **Participating professors** | A. Avdelas, N. Sideris, N. Kalogirou, C. Pyrgidis, P. Papaioanou, K. Pitilakis, S. Tsotsos, T. Chatzigogos, K. Stylianidis, C. Anagnostopoulos, A. Sextos |
| **Number of places** | Minimum: 10, Maximum: 30, Reserved for local students: 10 |
| **Objectives** | To provide the theoretical and practical background required for engineering students in order to gain an improved understanding of the financial, managerial and technical difficulties related to the construction of a new Metro system and its overall consequences to the city sustainability. |
| **Programme to be followed** | 4 morning lectures of 4 hours each and 4 evening lectures of 2 hours each plus **6 hours of site visit**.<br>**Topics of the lectures:**<br>Overview of the Thessaloniki Metro Project<br>Social Impact of Thessaloniki Metro<br>Archaeological aspects (to be confirmed)<br>Urban railway systems – Basic characteristics of Metro systems - Metro systems in Greece<br>Thessaloniki Metro: contribution to the sustainability of the city agglomeration<br>Installation of mechanical equipment for operational purposes (to be confirmed)<br>Principles for the seismic design and vulnerability assessment of metro tunnels: The case of Thessaloniki metro line<br>Geotechnical problems related to tunneling and underground works<br>Innovative construction techniques of the Thessaloniki Metro<br>Environmental implications of the Metro construction (to be confirmed)<br>Soil-structure interaction aspects and Metro construction |

Effects of Metro tunneling on the structural integrity of Thessaloniki monuments

'Hand-on' training on Finite Element modelling of the superstructure-soil-tunneling system using the computer code ANSYS (application at the Computer Lab. of the Department of Civil Engineering).

**Prerequisites** Basic knowledge of civil engineering

**Course exam** Written test on the last day of the course and a set of questions to be submitted after the end of the course.

| | |
|---|---|
| **Course code** | BME4 |
| **Course title** | Danube Bridges in Budapest |
| **Institution** | Budapest University of Technology and Economics |
| **Course address** | Budapest University of Technology and Economics |
| **City** | Budapest |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | None |
| **Key words** | Bridge, Danube, design, erection, reconstruction, aesthetics |
| **Language** | English |
| **Professor responsible** | Prof. László DUNAI |
| **Telephone** | +36 1 463 1791 |
| **Fax** | +36 1 463 1784 |
| **Email** | ldunai@epito.bme.hu |
| **Participating professors** | Prof. György FARKAS (BME), Asst. Prof. László HEGEDŰS (BME), Mr. Adrián HORVÁTH (Főmterv), Prof. Miklós IVÁNYI (PE), Asst. Prof. Katalin VÉRTES (BME) |
| **Number of places** | Minimum: 10, Maximum: 35, Reserved for local students: 5 |
| **Objectives** | The students of the BME do not need an introduction to the shape, role or importance of steel bridges: the bridges of Budapest offer a unique opportunity for everyone. Constructing bridges requires a wide range of engineering knowledge from foundations and superstructure to the planning of bridge traffic. In this course the subject of steel and iron bridges is presented, summarizing the problems of design, detailing, construction, maintenance and refurbishment. This requires a detailed treatment of aspects of both traditional and modern bridges, as modern bridges are to be built and traditional bridges are to be repaired or reconstructed. |
| **Programme to be followed** | Seven 2-hour lectures:<br>History of Budapest Danube bridges<br>Design, construction, maintenance and refurbishment of the bridges of Budapest<br>Static problems of bridges in Budapest<br>Bridge aesthetics<br>Role of bridges in the development of city construction<br><br>Three 2-hour exercises<br>Using a program from the Internet to design a bridge for given conditions<br><br>One-day visit to Budapest bridges (8 hours) |

| | |
|---|---|
| **Prerequisites** | General knowledge in Structural Mechanics, use of computer programs |
| **Course exam** | - Answering test questions - Evaluation of the bridge made by computer program |

| | |
|---|---|
| **Course code** | CTU03 |
| **Course title** | Text Searching Algorithms |
| **Institution** | Czech Technical University in Prague |
| **Course address** | |
| **City** | |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Stringology, finite automata, exact and approximate string matching, forward and backward string matching, factor automata, subsequence automata |
| **Language** | English |
| **Professor responsible** | Borivoj Melichar |
| **Telephone** | +420 2234 357 287 |
| **Fax** | +420 224 923 325 |
| **Email** | melichar@fel.cvut.cz |
| **Participating professors** | Jan Holub |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: 0 |
| **Objectives** | Text is the simplest and most natural representation of information in a range of areas. Text is a linear sequence of symbols from some alphabet. The text is manipulated in many application areas: processing of text in natural and formal languages, study of sequences in molecular biology, music analysis, etc.<br>The design of algorithms that process texts goes back at least thirty years. In particular, the 1990s produced many new results. This progress is due in part to genome research, where text algorithms are often used.The basic problem of text processing concerns string matching. It is used to access information and this operation is used very frequently. We have recognized while working in this area that finite automata are very useful tools for understanding and solving many text processing problems. We have found in some cases that well known algorithms are in fact simulators of non-deterministic finite automata serving as models of these algorithms. For this reason the material used in this course is based mainly on results from the theory of finite automata.Because the string is a central notion in this area, Stringology has become the nickname of this subfield of algorithmic research. |
| **Programme to be followed** | · Five 3-hour lectures: 1. Overview of Stringology, string matching problems, string matching and finite automata.2. Forward string matching, fail function, dynamic programming and bit parallelism.3. Factor automata, subsequence automata, repetition in text.4. Forward string |

matching, fail function.5. Backward string matching, models of backward string matching, Boyer-Moore algorithm. · Three 1-hour case studies: 1. Pattern matching in a two-dimensional text.2. Implementation of factor automata.3. String matching in a compressed text. · Three 2-hour seminars: 1. Mastering finite automata: determinisation, union, intersection, e-transitions removal, elimination of more than one initial states.2. Construction of string matching automata, factor and subsequence automata.3. Forward string matching.

**Prerequisites** Sets, relations, oriented graphs, finite automata, regular expressions.

**Course exam** Written exam with the duration of 1 hour, evaluation of the results.

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|---|---|
| **Course code** | CTU04 |
| **Course title** | Virtual Reality and VRML Language |
| **Institution** | Czech Technical University in Prague |
| **Course address** | Czech Technical University, Faculty of Electrical Engineering |
| **City** | Prague |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | None |
| **Minimum level of French** | None |
| **Key words** | virtual reality, VRML language, computer graphics, interaction, animation, simulation |
| **Language** | English |
| **Professor responsible** | Jiri Zara |
| **Telephone** | +420 2 2435 7311 |
| **Fax** | +420 2 2492 3325 |
| **Email** | zara@fel.cvut.cz |
| **Participating professors** | |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: 0 |
| **Objectives** | to understand the principles of virtual reality, especially targeted to the web,<br>to learn basic features of the VRML language,<br>to be able to create simple interactive and animated virtual reality scenes.<br>Virtual Reality Modeling Language (VRML) is the standard file format and the standard descriptive language for 3D on the Web. It allows to bring real-time 3D presentation to the screen of arbitrary user connected to the Internet. The course covers all parts of VRML starting from basic structure of VRML worlds - geometry, colors, textures, light, sound, and continuing to advanced features like animation, rich interactivity, and simulation. Functionality of VRML can be directly extended using Java and JavaScript - both languages will be briefly introduced, but JavaScript will be emphasized due to its simplicity. Combination of HTML, VRML, and Java applets will be presented, too. Participants of the course will be able to design either standalone dynamic virtual worlds or special modules suitable for presentation and visualization of data coming from other systems like databases, simulation programs, GIS, etc. |
| **Programme to be followed** | The course will be structured into lectures and practical exercises. Typically each morning class will consist of:<br>reviewing homeworks (individual assignments) from the previous day(s)<br>a lecture<br>The afternoon part will consist of: |

practicing methods from morning lecture

individual creation of virtual scene (assignment)

Lectures will cover:

a) VR systems.

b) Introduction to VRML.

c) Navigation paradigms

d) Avatar.

e) Static VRML worlds.

f) Geometry and Colors

g) DEF and USE Statements.

h) Prototypes.

i) Textures

j) Light and Audio Sources.

k) Tricky nodes - Billboard, LOD, Background

l) Animation

m) Interaction

n) Manipulators and Interpolators.

o) Script node and JavaScript

p) Java for VRML

q) External Authoring Interface

Each assignment will be rated by points.

**Prerequisites** General knowledge on three-dimensional computer graphics.

Be sure that you have attended at least a basic computer graphics course befory applying for this course!

**Course exam** Written exam with the duration of 1 hour. The result from the written exam will be combined with points received per assignments thus resulting in the final grade.

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|---|---|
| **Course code** | CTU10 |
| **Course title** | The PIV Method in Fluid Mechanics |
| **Institution** | Czech Technical University in Prague |
| **Course address** | |
| **City** | |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | PIV, flow visualization, experimental fluid mechanics |
| **Language** | English |
| **Professor responsible** | Jiri NOZICKA |
| **Telephone** | (420) 224 352 580 |
| **Fax** | (420) 224 352 570 |
| **Email** | jiri.nozicka@fs.cvut.cz |
| **Participating professors** | Address where the course will take place :Czech Technical University, Faculty of Mechanical Engineering, Technická 4, CZ-166 07 Prague 6, Czech Republic |
| **Number of places** | Minimum: 5, Maximum: 20, Reserved for local students: |
| **Objectives** | Particle Image Velocimetry (PIV) is one of the most progressive experimental methods used in fluid mechanics. With the basic set of experimental set up it allows the investigation on 2D flow fields. The extended version can be used for research of 3D flows, or/and in some special cases, temperature or concentration measurement, as well.The course is held in two different options· Course A – informative (basic) course· Course B – applied courseThe objective of Course A is to inform participants of the principals of PIV method and to show some axamples of the wide range of applications in fluid mechanics and machinery.Course B is intended for participants, who want to master the operation of the PIV systém and corresponding software |
| **Programme to be followed** | Theoretical part for all students: 7 lessons, 90 min. each1. PIV method, its history and development2. Contemporary systems – set up for 2D measurement3. 3D measurement4. Temperature and concentration measurement (PLIV)5. Special cases – micro PIV, 3D and PLIV measurement with basic 2D setup6. Data evaluation, statistical method used7. Control systém – introduction to the software support Practical part – Either Course (A): 7 lessons, 90 min. eachDemonstration of some typical applications in the laboratory, presentation of results of technical problems solved. Practical part – or course (B): 7 lessons, 90 min. eachSome typical tasks will be investigated by participants under the supervision of lecturer. |
| **Prerequisites** | General knowledge of fluid mechanics and thermodynamics (basic course). |
| **Course exam** | The evaluation of the students' acquired knowledge will be based on regular examinations during the |

practical part of the course.

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|---|---|
| **Course code** | CTU15 |
| **Course title** | Digital Signal and Image Processing with Applications |
| **Institution** | Czech Technical University in Prague |
| **Course address** | Institute of Chemical Technology, Faculty of Chemical Engineering, TechnickÃ¡ 5, CZ-166 28 Prague 6, Czech Republic |
| **City** | Prague |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | None |
| **Minimum level of French** | None |
| **Key words** | Signal analysis, discrete Fourier transform, Wavelet transform, signal and image processing, digital filters, biomedical signals, environmental signals, energy consumption signals, Matlab environment |
| **Language** | English |
| **Professor responsible** | AleÅ¡ PROCHÃZKA |
| **Telephone** | 420 220 444 198 |
| **Fax** | 420 220 445 053 |
| **Email** | A.Prochazka@ieee.org |
| **Participating professors** | |
| **Number of places** | Minimum: 8, Maximum: 15, Reserved for local students: 0 |
| **Objectives** | The main goal of the course is to:<br>1. present selected mathematical and algorithmic structures in MATLAB environment used for signal analysis and processing<br>2. study fundamentals of discrete Fourier transform and its properties in connection with signal and image analysis and discretization<br>3. analyse principles if digital filtering in the time (FIR, IIR) and frequency domains for signal de-noising and image enhancement<br>4. discuss selected mathematical methods of signal analysis and to present fundamentals of wavelet transform in signal decomposition, modification and reconstruction with applications<br>5. summarize basic principles of signal modelling in its prediction using both linear and nonlinear methods including neural networks<br>6. present selected applications of signal processing in environmental engineering, biomedical signal and image processsing and energy consumption data prediction |

It is supposed that course participants will be able to use the MATLAB environment to solve selected problems of the interdisciplinary area of signal and image processing, to use its visualization tools, and to study selected applications of digital signal processing methods.

**Programme to be followed**

Five 3-hour lectures:

1. Algorithmization in the MATLAB environment, visualization, programming tools, data processing.
2. Principles of the discrete Fourier transform, properties, applications
3. Digital filtering using difference equations. Frequency domain filters
4. Approximation of functions. Discrete Wavelet transform, basic definitions, signal decomposition, de-noising, reconstruction
5. Signal prediction, linear models, neural networks, optimization

Three 1 hour case studies:

1. Two-dimensional modelling of air pollution data
2. Energy consumption data analysis
3. EEG signal de-noising

Four 2-hour seminar work:

1. Programming in MATLAB, structured data, computer graphics
2. Signal acquisition, visualization, analysis
3. Digital filters, graphical user interphase
4. Discussion of results

One 4-hour excursion:

Image acqusition of biomedical data using magnetic resonance

**Prerequisites**

Basic knowledge of numerical mathematics.

**Course exam**

Continuous evaluation through laboratory exercises and an evaluation test at the end of the course.

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| **Course code** | CTU18 |
| **Course title** | Physics of Extreme Systems |
| **Institution** | Czech Technical University in Prague |
| **Course address** | Trojanova 13, Prague 2 |
| **City** | Prague |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Extreme states of matter, high-energy-density physics, superstrong field photonics, x-ray laser, inertial confinement fusion, dense plasma astrophysics |
| **Language** | English |
| **Professor responsible** | Ladislav Drska |
| **Telephone** | +420 224 358 636 |
| **Fax** | +420 224 358 624 |
| **Email** | drska@antu.fjfi.cvut.cz |
| **Participating professors** | J. Limpouch, R. Liska, M. Kalal, B. Rus (IOP), M. Sinor, J. Ullschmied (IPP) |
| **Number of places** | Minimum: 5, Maximum: 20, Reserved for local students: 5 |
| **Objectives** | 1. Introduction to physics of high-energy-density matter : theory, experiment, simulation. - 2. Presentation of key applications of high-energy-density physics : x-ray lasers, inertial fusion, laboratory astro-<br>physics.- Providing of an evaluated collection of printed / electronic resources to these topics. |
| **Programme to be followed** | Introduction. Postmodern Physics & Extreme Systems. Seminar 1 : ABC of Plasmas & Computational Physics. - Physics of Extreme States of Matter. Subpicosecond / Superstrong Field Photonics. Seminar 2 : Simulation of Extreme Systems. - X-Ray Lasers and Their Applications. *Lab.Visit 1 : FNSPE - Dept.of Physical Electronics, Dept. of Nuclear Reactors* . - Physics of Nucleoreactive Plasmas. PALS Laboratory, Concepts & Research Activities. *Lab. Visit 2 : AS CR – Inst. of Plasma Physics, PALS* . - Computational and Laboratory Astrophysics. Inertial Confinement Fusion & Thermonuclear Reactors. Conclusion. Final Test. - Course Web Site : http://vega.fjfi.cvut.cz/docs/athens07a/ |
| **Prerequisites** | A course of introductory / applied physics, basic knowledge of modern physics (e.g. Halliday et al.: Physics, Chap. 38 – 45). |
| **Course exam** | Final e-test |

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|---|---|
| **Course code** | IST3 |
| **Course title** | Operational Research |
| **Institution** | Instituto Superior Tecnico Lisboa |
| **Course address** | web.ist.utl.pt/mcasquilho |
| **City** | Lisbon |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Operational Research, Operations Research, Optimization, Linear Programming, Monte Carlo simulation, Queueing (Waiting Line Theory), Travelling salesman problem |
| **Language** | English |
| **Professor responsible** | Miguel Casquilho |
| **Telephone** | +351.21.8417310 |
| **Fax** | +351.21.8499242 |
| **Email** | mcasquilho@ist.utl.pt |
| **Participating professors** | |
| **Number of places** | Minimum: 10, Maximum: 18, Reserved for local students: 0 |
| **Objectives** | In a time of competitiveness and scarcity of raw materials, an industrial (indeed, any) system must work in a state not far from its optimum, "small" improvements being sometimes crucial for success or even survival. Operational Research (OR*) supplies specific techniques to optimize and manage, and promotes habits of analysis arising from the inspection of the system model. The central objective of OR is **optimization**, i.e., "to do things best under the given circumstances", to the greatest profit or smallest cost. This general concept has many applications: agricultural planning, biotechnology, distribution of goods and resources, engineering systems design, environmental management, health care management, inventory control, manpower and resource allocation, manufacturing of goods, military operations, production process control, sequencing and scheduling of tasks, telecommunications, traffic control.<br>Only some of the applications mentioned will be addressed in the course (see Programme below). The computer and the Internet will be indispensable tools. *"Operations Research" in American English. |
| **Programme to be followed** | **Linear Programming** Historical note. Model. Dantzig's simplex algorithm; matrix method; duality. Computational resolution.<br>**Transportation Problem** Model. Stepping-stone algorithm. Computational resolution.<br>**Monte Carlo simulation** Sampling experiments on models. Random number generation.<br>**Queueing (waiting line) theory** Structure of the models. Poisson arrivals, exponential servicing. |

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| | Infinite and finite populations. Computational resolution. (This chapter introductorily or if time permits.)<br>**Inventory management** Models. Uniform demand; random demand. Optimal inventory level. Computational resolution. (This chapter introductorily or if time permits.)<br>**Travelling Salesman Problem** Route optimization in cycles. Computational resolution. (This chapter introductorily or if time permits.) |
| **Prerequisites** | Basic knowledge of: Linear Algebra; Calculus; Probability & Statistics.Basic knowledge of Excel. |
| **Course exam** | Written exam (on the last day of course); open book; made on computer; delivered by e-mail. |

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| **Course code** | IST6 |
| **Course title** | Elab – Remotely Controlled physics laboratories |
| **Institution** | Instituto Superior Tecnico Lisboa |
| **Course address** | Instituto Superior Tecnico |
| **City** | Lisbon |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Electronic instrumentation, JAVA, remote controlled instrumentation, data acquisition, microprocessors. |
| **Language** | English |
| **Professor responsible** | Prof. Horácio Fernandes |
| **Telephone** | +351218417619 |
| **Fax** | |
| **Email** | hf@cfn.ist.utl.pt |
| **Participating professors** | Prof. Horácio Fernandes |
| **Number of places** | Minimum: 6, Maximum: 12, Reserved for local students: |
| **Objectives** | The elab project allows the remote manipulation of scientific experiments trough a WEB interface. Several experiences are already on-line trough this technology as seen at http://elab.ist.eu. The objective of the course is to provide students with all the knowledge to create their own elab server, including the ability to project and develop robotized experiments. It is expected that students will acquire basic skills on JAVA and C (PIC) programming, which includes a course of Microprocessors and basis of electronic instrumentation. |
| **Programme to be followed** | PIC Programming: from assembler to C. Basics of Electronic Instrumentation. General architecture of the elab system:<br>Video Broadcast and video resolution.<br>The multicast server<br>The hardware clients<br>The customizers<br>State machines Analog to Digital Converters Sensors and transducers Introduction to JAVA programming |
| **Prerequisites** | Engineering degree students with courses on Programming and physics are recommended. |
| **Course exam** | 4 hours laboratory exam. |

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|---|---|
| **Course code** | ITUAER02 |
| **Course title** | Engineering Approaches in Aerospace: Experimental and Numerical Studies, Design and Prototyping |
| **Institution** | Istanbul Technical University |
| **Course address** | Istanbul Technical UniversityITU, Faculty of Aeronautics and Astronautics, Ayazaga Campus, Maslak 34469 |
| **City** | Istanbul |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | experimental aerodynamics, computational fluid dynamics, control and avionics, design, prototyping, structural testing |
| **Language** | English |
| **Professor responsible** | Oksan CETINER |
| **Telephone** | +90 (212) 285 3114 |
| **Fax** | +90 (212) 285 3139 |
| **Email** | cetiner@itu.edu.tr |
| **Participating professors** | http://www.uubf.itu.edu.tr/Icerik.aspx?sid=2100#akademikhttp://www.uubf.itu.edu.tr/Icerik.aspx?sid=2101#akademik |
| **Number of places** | Minimum: 5, Maximum: 20, Reserved for local students: 0 |
| **Objectives** | - to provide students with an introduction to different approaches in aerospace engineering - to introduce students to practical applications in aerospace engineering |
| **Programme to be followed** | Monday: WIND TUNNELS Morning: Subsonic Wind Tunnels, Water Channels, Afternoon: Supersonic Wind Tunnels *Visit to Trisonic Laboratory*<br><br>Tuesday: CONTROL AND AVIONICS Morning: Design and Development of Microavionics Systems for UAV Navigation, Guidance and Control, Afternoon: Networked Enabled Control: Path-Planning, Fleet Coordination and Human-Machine Group Interfaces *Visit to Control and Avionics Laboratory*<br>Wednesday: MEASUREMENT TECHNIQUES Morning: Data Acquisition-Pressure Measurements, Afternoon: Calibration-Balance Measurements *Visit to Trisonic Laboratory*<br>Thursday: DESIGN, PROTOTYPING AND STRUCTURAL TESTING - Rotorcraft Design Morning: Use of Virtual Reality in Design and Manufacturing, Computational Fluid Dynamics for Rotorcraft Aerodynamics and other aerospace applications *Visit to Rotorcraft Design Center*, Afternoon: Reverse Engineering and Prototyping *Visit to related facilities*, Structural tests of a Helicopter Blade *Visit to the Composite Laboratory*<br>Friday: MODERN TECHNIQUES FOR FLOW DIAGNOSTICS Morning: PIV (Particle Image Velocimetry), Afternoon: CTA (Constant Temperature Anemometry), LDA (Laser Doppler Anemometry) *Visit to Trisonic Laboratory* |
| **Prerequisites** | The attendants should be at least in their 3rd year of undergraduate studies in Aerospace Engineering, |

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| | Mechanical Engineering or related fields. General knowledge of numerical methods, fluid mechanics, strength of materials and automatic control (basic courses). |
| **Course exam** | - Active participation in the course - Evaluation test at the end of the course |

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| **Course code** | ITUMOL01 |
| **Course title** | Molecular Tools to Study Microbial Ecology |
| **Institution** | Istanbul Technical University |
| **Course address** | Istanbul Technical University Faculty of Civil Engineering, Department of Environmental Engineering, 34469 Maslak/Istanbul, Turkey |
| **City** | Istanbul |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Molecular Microbial Ecology, Environmental Biotechnology, PCR, Real Time PCR, Fluorescence in situ hybridization, Denaturant Gradient Gel Electrophoresis, Cloning, Sequencing, Phylogenetic Analysis |
| **Language** | English |
| **Professor responsible** | Orhan Ince |
| **Telephone** | +90 212 2856570 |
| **Fax** | +90 212 2856587 |
| **Email** | oince@ins.itu.edu.tr |
| **Participating professors** | Bahar Ince, Candan Tamerler Behar, Ece Sen, Nilgun Ayman Oz, Mustafa Kolukirik, Ozge Eyice, Zeynep Cetecioglu |
| **Number of places** | Minimum: 10, Maximum: 20, Reserved for local students: 0 |
| **Objectives** | The main goal of the course is to:<br>1. Discuss importance of studying microbial ecology of natural and engineered ecosystems.<br>2. Discuss advantages of molecular tools over traditional cultivation based methods to study microbial ecology.<br>3. Present selected DNA and RNA targeted molecular methods used in microbial ecology<br>4. Apply DNA extraction, polymerase chain reaction (PCR), Real Time PCR, Fluorescence in situ hybridization (FISH), Denaturant Gradient Gel Electrophoresis (DGGE), Cloning-sequencing and phylogenetic analysis of genes retrieved from environmental samples. |
| **Programme to be followed** | Five 2-hour lectures:1. Introduction to microbial ecology of natural and engineered ecosystems, basics of DNA extraction, PCR and agarose gel electrophoresis2. Importance of studying microbial ecology, basics of Q-PCR and DGGE3. Advantages of molecular tools for evaluation, basics of cloning and sequencing 4. DNA/RNA targeted molecular methods used in microbial ecology-I, basics of FISH.<br>5. DNA/RNA targeted molecular methods used in microbial ecology-II, basics of bioinformatics<br>Five 4-hour laboratory studies: 1. DNA extraction, PCR and agarose gel electrophoresis2. Q-PCR and DGGE3. Cloning and Sequencing4. FISH |

Bioinformatics

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| **Prerequisites** | Basic knowledge of molecular biology and microbiology. |
| **Course exam** | An evaluation test at the end of the course. |

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|---|---|
| **Course code** | KUL2 |
| **Course title** | Art Nouveau in Belgium: History and Conservation |
| **Institution** | Katholieke Universiteit Leuven |
| **Course address** | Dept. of Architecture and Urban Planning / Raymond Lemaire Centre for Conservation , Kasteelpark Arenberg 1, B-3001 Heverlee (Leuven) |
| **City** | Leuven |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Fluent |
| **Minimum level of French** | Good |
| **Key words** | architectural history, construction history, conservation |
| **Language** | English and French |
| **Professor responsible** | Prof. B. Van der Wee / Prof. L. Verpoest |
| **Telephone** | +32 16 32 13 61 |
| **Fax** | : +32 16 32 19 84 |
| **Email** | luc.verpoest@asro.kuleuven.be / barbara.vanderwee@asro.kuleuven.be |
| **Participating professors** | |
| **Number of places** | Minimum: 15, Maximum: 25, Reserved for local students: 5 |
| **Objectives** | Introduction into the history of late 19th century architecture, more particularly the Art Nouveau movement in Belgium in an international context; particular attention is given to the influence of the development of new building materials and construction technologies in the 19th century on the Art Nouveau architecture; during site visits in Brussels the focus will be on recent conservation and restoration projects of works by the Belgian architect Victor Horta, key figure of the Art Nouveau movement. |
| **Programme to be followed** | "gain knowledge in<br>- the origin of a style : "" art nouveau "" in its historic context<br>- architectural innovations: plan, façade, spatial concept<br>- structural and technical aspect of building : the use of iron<br>- furniture and interior decoration<br>- spread of Art Nouveau in Europe<br>- conservation policy: special techniques and interventions<br><br>The course will be illustrated by case studies and visits of buildings of Victor Horta, Paul Hankar, Henry Van de Velde, etc . ..." |
| **Prerequisites** | A basic knowledge of 19th century architectural history or construction/engineering history |

recommended

**Course exam** Paper

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|---|---|
| **Course code** | KUL9 |
| **Course title** | Scientific Programming in C++ |
| **Institution** | Katholieke Universiteit Leuven |
| **Course address** | Celestijnenlaan 200A, 3001 Heverlee-Leuven, Belgium |
| **City** | Leuven |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | C++, numerical mathematics, scientific programming, generic programming, numerical simulation |
| **Language** | English |
| **Professor responsible** | Karl Meerbergen |
| **Telephone** | 003216327959 |
| **Fax** | 003216329796 |
| **Email** | karl.meerbergen@cs.kuleuven.be |
| **Participating professors** | Prof. Karl Meerbergen and Dr. Peter Gottschling (TU Dresden) |
| **Number of places** | Minimum: 5, Maximum: 20, Reserved for local students: 5 |
| **Objectives** | The goal is to make students familiar with the possibilities of the programming language C++ for the development of numerical software. The coarse does not offer a full study of the programming language, but mainly introduces those features that make C++ suitable for scientific programming (generic programming, functors, expression templates). In that respect the course has a basic character, but also contains a deep study of some aspects. |
| **Programme to be followed** | The topics that will be discussed are several aspects of the syntax of C++, an introduction to generic programming, functors, expression templates, GLAS or MTL4, and Boost.Bindings. The software tools used are the GCC compiler and the gdb debugger on a linux PC, embedded in the graphical interface Eclipse. The lectures and exercises are held in a computer room where each student has a PC. |
| **Prerequisites** | Knowledge of C++ is not required, but significant experience with programming (Fortran, Java, C++, Matlab, Python, or other languages) is mandatory. Preliminary knowledge of numerical mathematics (e.g. the power method, finite differences and the bisection zerofinder) is helpful since examples and the exam are numerical. |
| **Course exam** | At the end of the week, the student will solve a small numerical simulation problem of its own choice, or chosen among the list of applications proposed by the lecturer. |

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|---|---|
| **Course code** | KUL10 |
| **Course title** | A sustainable future for iron and steel? |
| **Institution** | Katholieke Universiteit Leuven |
| **Course address** | Department of Metallurgy and Materials Engineering, Kasteelpark Arenberg 44 box 2450 |
| **City** | 3001 Heverlee-Leuven |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | iron, steel, thermodynamics, sustainability |
| **Language** | English |
| **Professor responsible** | Patrick Wollants |
| **Telephone** | 003216321310 |
| **Fax** | 003216321991 |
| **Email** | patrick.wollants@mtm.kuleuven.be |
| **Participating professors** | Bart Blanpain, Jef Roos and Postdoc Frederik Verhaeghe |
| **Number of places** | Minimum: 9, Maximum: 30, Reserved for local students: |
| **Objectives** | The goal of the course is to provide a basis for the students to understand the production process of iron and steel, with a focus on the basic chemistry, the technology, the economic aspects and the ecological challenges. |
| **Programme to be followed** | fundamentals of thermodynamics and extractive metallurgy, fundamentals of iron and steelmaking, economics of iron and steelmaking, Perspectives on new iron and steelmaking processes and the ecological challenges, introduction to HSC, virtual steelmaking challenge, plant visit Arcelor-Mittal Ghent, project work |
| **Prerequisites** | basic course in chemistry and thermodynamics |
| **Course exam** | project work + presentation |

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|---|---|
| **Course code** | TUD01 |
| **Course title** | Industrial Ecology – Making Sustainability happen |
| **Institution** | Delft University of Technology |
| **Course address** | Faculty of Applied Sciences, Delft University of Technology, Lorentzweg 1, 2628 CJ Delft, the Netherlands |
| **City** | Delft |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Fluent |
| **Minimum level of French** | None |
| **Key words** | Environmental science, sustainable development, industrial ecosystems |
| **Language** | English |
| **Professor responsible** | Dr. ir. G. (Gijsbert) Korevaar (PhD, MSc) |
| **Telephone** | +31.15.27.83659 |
| **Fax** | +31.15.27.88572 |
| **Email** | g.korevaar@tudelft.nl |
| **Participating professors** | Gijsbert Korevaar and several guest lecturers to be announced |
| **Number of places** | Minimum: 25, Maximum: 25, Reserved for local students: |
| **Objectives** | In the area of sustainable development, Industrial Ecology is a relatively new field of research that is rapidly emerging on a global scale. The core concept of the research field is the analogy between ecosystems and systems in society. In other words: processes in nature, where cycles are closed and waste from one process is input for another, are taken as models for industrial processes.Industrial ecology encompasses the study of:- Natural resources, their renewal and their abundance- Technologies and systems to transfer these resources into goods and services- Consumption patterns of these goods and services- Organization of these processes along the entire life-cycle- Processes of technological change- Processes of social political changeSee for more information: www.industrialecology.nl |
| **Programme to be followed** | In this course module, the students will work on a practical company-related application of Industrial Ecology as a business class. During the morning sessions, some basic tools are introduced like life cycle assessment, eco-design, and environmental management systems. In the afternoons the students are working together in groups on specific problems contributing to the integral solution of the business case. On the final day the results are presented for a forum of business people and staff members.<br>Monday: morning, introduction of the industrial ecology concept; introduction of the business case. afternoon, group work – problem statement, research questions and approach |

Tuesday: morning, analysis of industrial systems, environmental impacts, life cycle assessment theory afternoon, group work – environmental impact assessment, life cycle issues
Wednesday: morning, design of industrial systems, eco-design approaches, sustainability metrics and indicators, criteria evaluation. afternoon, excursion to a relevant industrial site
Thursday: morning, implementation of sustainability solutions, cleaner production, environmental management systems, innovation trajectories. afternoon, group work – creativity sessions, generation of alternatives, integration of solutions, definition of implementation path
Friday: morning, final presentations

**Prerequisites**

**Course exam** Assessment on the basis of performance during group project, attendance of lectures and the final presentations.

| | |
|---|---|
| **Course code** | TUD02 |
| **Course title** | Multimodal emotion detection |
| **Institution** | Delft University of Technology |
| **Course address** | Mekelweg 4, 2628 CD |
| **City** | Delft |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Multi-modal communication, automatic speech recognition, recognition of facial expressions, nonverbal communication, dialogue management, aggression detection |
| **Language** | English |
| **Professor responsible** | Prof. Drs. dr. L.J.M. Rothkrantz |
| **Telephone** | +31152787504 |
| **Fax** | +31152787141 |
| **Email** | L.J.M.Rothkrantz@tudelft.nl |
| **Participating professors** | Dr. ir. P. Wiggers, ir. Z. yang |
| **Number of places** | Minimum: 13, Maximum: 13, Reserved for local students: |
| **Objectives** | Traditional interfaces of computers are keyboard and mouse. A more natural, human like interface is based on voice, touch, gaze and face-input. The semantic interpretation of the multimodal input is context sensitive. Information from the environment but also mood and emotions have an impact on the user experiences.<br>In the course an introduction will be presented on Automatic speech recognition, the recognition of emotion in facial expressions and speech. As application we discus surveillance camera's with microphones<br>To design a multimodal interface different modalities have to be fused. Fusion of different modalities requires a solution to the ambiguity and a-synchronicity of different signals. To apply the theory parallel to the course there is a lab assignment. In these lab assignments students have to build a multimodal interface using the CSLU-toolkit. |

**Programme to be followed**

| Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Introduction to Multimodal CommunicationEngineering experiences | Introduction to automatic speech recognition | Advanced topics in Automatic speech recognition and applications | Automatic recognition of emotion in facial expressions and speech.Application to surveillance in public spaces | Automatic lip readingUsability of intelligent systems |

**Prerequisites** Students are assumed to have basic knowledge in signal processing, mathematics and programming. A completed BSc in Electrical Engineering, Informatics, Physics or related studies is more than sufficient. Experience in programming is recommended but not necessary

**Course exam** Students have to write a report about the lab assignment. The report will be discussed and evaluated by a staff member. The last day they have to give a presentation on their work. The course will be closed by a presentation of the lab work of the students. The grade of the course is based on the report, oral presentation and discussion with the lecturers of the course

| | |
|---|---|
| **Course code** | TUD03 |
| **Course title** | Emergency management in design & construction, get ready to (re)act! |
| **Institution** | Delft University of Technology |
| **Course address** | Faculty of Architecture, dept. of Real Estate & Housing, Julianalaan 132, 2628 BL |
| **City** | Delft |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Multi-disciplinary collaboration, organisational forms, contract forms, selection of parties, division of tasks |
| **Language** | English |
| **Professor responsible** | prof.dr.ir. J.W.F. Wamelink |
| **Telephone** | +31 (0) 15 27 84159 |
| **Fax** | +31 (0) 15 27 83171 |
| **Email** | re-h@bk.tudelft.nl |
| **Participating professors** | Hans Wamelink, Louis Lousberg |
| **Number of places** | Minimum: 13, Maximum: 13, Reserved for local students: |

**Objectives**

- Obtaining an insight into the building process in disaster situations
- How to act efficiently and effectively in such a disaster situation
- Creating (a) good accommodation (plan)

**Programme to be followed**

In an unforeseen situation, such as a fire, an earthquake or a flood, how are you to arrange rehousing of people and organisations? After a disaster, action is to be taken quickly in the first place for temporary rehousing of people and organisations. Initially, this accommodation only provides for basic needs. In the second place, a long-term plan is to be prepared that provides for durable accommodation. This rehousing process requires a different approach than the usual design & construction management processes. Studying several cases (fire at the Faculty of Architecture, hurricane Katrina, tsunami in Indonesia) allows for a better understanding of the process of emergency management in design & construction. This knowledge is used to develop a theoretical framework.

**Prerequisites**

**Course exam**

- Case studies
- Final presenation

| | |
|---|---|
| **Course code** | TUD04 |
| **Course title** | Stepping twice in the same river - Water Management |
| **Institution** | Delft University of Technology |
| **Course address** | Department of Civil Engineering and Geosciences, Stevinweg 1 |
| **City** | Delft |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | water resources management, water systems, games |
| **Language** | English |
| **Professor responsible** | dr. ir. M.W. Ertsen |
| **Telephone** | +31 15 278 7423 |
| **Fax** | +31 15 278 5559 |
| **Email** | m.w.ertsen@tudelft.nl |
| **Participating professors** | Dr. Erik MostertIr. Martine PoolmanIr. Sandra Junier17 |
| **Number of places** | Minimum: 17, Maximum: 17, Reserved for local students: |
| **Objectives** | After this course students will understand the links between (properties of) water systems and (goals of) stakeholdersAfter this course students will be able to draft first order analysis of these links for several water systems |
| **Programme to be followed** | Managing water is said to be complex, which is probably true. Many aspects need to be taken into account by many stakeholders; often desires and ideas are different for different stakeholders. This course allows participants to experience several real-life situations in water management, including collecting information on a river basin, managing an international river and irrigating their crops. During 4 morning sessions the students will experience real-life situations in water management by participating in one role play or game per morning. These games are selected in order to highlight one or two aspects of water system management (technical, managerial, social, political, etcetera) in different settings (river basin, irrigation system, groundwater). During the afternoon sessions small groups of students evaluate their morning games, using supporting documents. Each day, students write an individual evaluation report. These reports will be read and commented upon by peers from the discussion group. |
| **Prerequisites** | Understanding of minimally the hydrological cycle and if possible fluid mechanics is required. |
| **Course exam** | Personal evaluations per day and peer reviews<br>Final presentation per discussion group |

| | |
|---|---|
| **Course code** | TUD05 |
| **Course title** | Introduction into Finite Element |
| **Institution** | Delft University of Technology |
| **Course address** | Numerical Analysis Group - Delft Institute of Applied Mathematics (DIAM) - TU Delft |
| **City** | Delft |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | finite element method, partial differential equations, numerical mathematics |
| **Language** | English |
| **Professor responsible** | Dr. D. Lahaye |
| **Telephone** | +31.015.27.87.257 |
| **Fax** | +31.015.27.87.209 |
| **Email** | d.j.p.lahaye@tudelft.nl |
| **Participating professors** | Dr. D. Lahaye and Dr. F. J. Vermolen |
| **Number of places** | Minimum: 22, Maximum: 22, Reserved for local students: |
| **Objectives** | This course provides the understanding in the basic principles of the finite element method (FEM) for solving cannonical elliptic and parabolic partial differential equations modeling diffusion and transport phenomena. Unlike courses elaborating the mathematical foundations of the FEM on one hand, and those focussing on a particular software package for solving advanced engineering applications on the other end of the spectrum, this course discusses the algorithmic aspects of the FEM. Starting from either a boundary of initial value problem, the variational formulation is derived to be able to subsequentially discretize the problem in space and time. The element-by-element construction of the discrete problem and algorithms to solve it are presented. At the end of this course students will have gained the theoretical knowledge and constructed a software framework enabling them to build their own finite element solver package. |
| **Programme to be followed** | Course description: model equations, minimization problems, variational formulation and differential equations, numerical methods for time de<br><br>Preliminary course set-up:<br>- Monday: Morning: Model Equation - Preliminaries - Minimization Problems. Afternoon: Introduction into MATLAB<br>- Tuesday: Morning: Variational Formulation and Differential Equations. Afternoon: Element-by-element assembly |

- Wednesday: Morning: Galerkin's Finite Element Method. Afternoon: One-dimensional element matrices
- Thursday: Morning: Numerical Methods for time dependent problems. Afternoon: Time-integration
- Friday: Morning: Engineering Applications. Afternoon: Solving two-dimensional problemspendent problems and numerical linear algebra.

**Prerequisites** Basic knowledge of linear algebra, calculus, numerical mathematics and solving differential equations. Student input: attendence of the lectures and completion of lab assigments

**Course exam** Reward in accordance with dedication to the lectures and practical assigments

Course notes: the lecture notes for this course can be retrieved from
http://ta.twi.tudelft.nl/nw/users/domenico/intro fem/intro fem.html

| | |
|---|---|
| **Course code** | TUM10 |
| **Course title** | Application of Glass in Structural Engineering |
| **Institution** | Technische Universität München |
| **Course address** | University of the armed forces Munich, Werner-Heisenberg-Weg 39, 85577 München/Neubiberg |
| **City** | München |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Application of Glass, Structural Eengineering, Glass Building Material |
| **Language** | English |
| **Professor responsible** | Prof. Dr.-Ing. Geralt Siebert |
| **Telephone** | +49(0)89 6004 2521 |
| **Fax** | +49(0)89 6004 3471 |
| **Email** | geralt.siebert@unibw-muenchen.de |
| **Participating professors** | |
| **Number of places** | Minimum: 8, Maximum: 20, Reserved for local students: 0 |
| **Objectives** | Introduction:<br>Glass as building material for load bearing structural elements (Temered glass types, laminated glass, manufacturing and special behaviour)<br>Requirements for glass structures given by building authority<br>Design of structural elements made of glass:<br>Actual technical rules / standards<br>Design based on fracture mechanics and modern safety concept<br>Future rules / standards (DIN, DIN EN, ...) |
| **Programme to be followed** | Calculation and modeling of Glass elements:<br>Linear bearing - Point fixed glazing<br>Simple methods - FEA<br>Special problems in FEA modeling<br>Testing in laboratory - why? Examples<br>Examples of realised projects<br>Excursion to realised projects (e.g. Herz-Jesu Kirche) |
| **Prerequisites** | Good level in **engineering mechanics** |

Basics knowledge in architecture

Good level in **spoken and written** English

**Course exam**

- Active participation at the seminary
- Examination at the end of the seminary

| | |
|---|---|
| **Course code** | TUM13 |
| **Course title** | Structural Vibrations in Engineering |
| **Institution** | Technische Universität München |
| **Course address** | Technische Universität München, Arcisstraße 21 |
| **City** | Munich |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Structural Dynamics; Mechanical Engineering; Applications in Engineering |
| **Language** | Englich |
| **Professor responsible** | Dipl. –Ing. Martin Buchschmid |
| **Telephone** | +49 089 289 28574 |
| **Fax** | +49 089 289 28665 |
| **Email** | martin.buchschmid@bv.tum.de |
| **Participating professors** | Dipl. –Ing. Martin Buchschmid, TU München<br>Prof. Gerhard Müller, TU München |
| **Number of places** | Minimum: 7, Maximum: 30, Reserved for local students: 0 |
| **Objectives** | This course deals with vibrations in structural engineering (e.g Civil-Engineering or Machine-Engineering). Structures (e.g. buildings) are excited as by external forces (traffic, wind) as by loads within the structure (e.g. pedestrians). These vibrations reduce the serviceability of the building (e.g. due to reradiated noise) or can even destroy the structure (e.g. in case of earthquakes).<br>The lectures will tackle the mechanical background of vibrations and their differential equations of motion as well as the different types of dynamic loads. Examples will give the relation to practical systems (pedestrian bridges, machinery foundations, bell towers). An introduction will be given into the basics of Stochastic Vibrations.<br>Methods to reduce vibrations (e.g. Tuned Mass Dampers) will be discussed in the lecture. The topics of the course will additionally be treated by numerical methods (in computer workshops) and measurements (in a students lab) in order to get a "feeling for mechanics".<br>The problem of reradiated sound (sound cause by vibrations) and some general aspects of acoustics are topic of an excursion.<br>Concluding the course some information is given about current research topics. |
| **Programme to be followed** | Visit of the Students-Labs for Measurements in Structural Dynamics (Chair of Technical Mechanics)<br>Bachelor and Master Students will present their projects. |
| **Prerequisites** | - good level in engineering mechanics and dynamics (min 3 years of engineering studies)<br>- skills in computeralgebra-systems (e.g. Maple, Matlab, Mathematica) are useful (but not compulsory) |

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|---|---|
| **Course exam** | Examination at the end of the course; Active participation in the course |

| | |
|---|---|
| **Course code** | TUW7 |
| **Course title** | How Physics Inspires Science Fiction |
| **Institution** | Technische Universität Wien |
| **Course address** | Karlsplatz 13 |
| **City** | Wien |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | physics, imagination, creativity, science fiction |
| **Language** | English |
| **Professor responsible** | Peter Schattschneider |
| **Telephone** | +43 1 58801 13722 |
| **Fax** | +43 1 58801 13798 |
| **Email** | schattschneider@ifp.tuwien.ac.at |
| **Participating professors** | Schattschneider, Bernardi, Stöger |
| **Number of places** | Minimum: 0, Maximum: 25, Reserved for local students: 0 |
| **Objectives** | This course aims at demonstrating that physics can be entertaining, surprising, and applicable when combined with creativity.<br><br>We understand how physics - and more generally a scientific approach - can inspire science fiction writers. We shall critically read selected SF stories and prove or disprove the authors' claims. As a by-product, we learn about prognostics in science and SF, about supernovae, black holes, the role of constants in nature, the impossibility of skyscraper-high spider monsters, and we get a glimpse of the sometimes amusing consequences of Einsteins relativity. The students' imagination will be challenged by the demand to complete a scientific text. |
| **Programme to be followed** | Reading of selected texts<br>Critical discussions<br>Scientific basics to judge the authors' claims<br>Completion of a selected scientific text |
| **Prerequisites** | Basic understanding of the laws of physics (school level) |
| **Course exam** | Writing /explaining a sound SF story (in small groups) |

| | |
|---|---|
| **Course code** | TUW8 |
| **Course title** | Ultrasound in Nature, Engineering and Medicine |
| **Institution** | Technische Universität Wien |
| **Course address** | Resslgasse 4 |
| **City** | Wien |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | SONAR, Therapeutic and Diagnostic Ultrasound, NDT Nondestructive Testing, Sololuminiscence, Sonothrombolysis, Sonoporation, Ultrasonic Levitation, Ultrasonic Particle Separation, Acoustic Bio-Cell Filters, Ultrasonic Emulsion Splitting |
| **Language** | English |
| **Professor responsible** | Ewald Benes |
| **Telephone** | +43 1 58801 13470 |
| **Fax** | +43 1 58801 13499 |
| **Email** | ewald.benes@tuwien.ac.at |
| **Participating professors** | Stefan Radel, Branka Devcic |
| **Number of places** | Minimum: 0, Maximum: 25, Reserved for local students: 0 |
| **Objectives** | The students of this ATHENS course will become familiar with the fundamentals and with all important applications of ultrasound. |
| **Programme to be followed** | SONAR orientation sense of bat and dolphin; importance of SONAR for the U-boat localisation in world war II; Ultrasound non-destructive material testing; Sono-luminiscence; Ultrasonic separation of suspend particles; Highlights of European Training and Mobility Network "UltraSonoSep" http://eaps3.iap.tuwien.ac.at/www/euss/ ; Acoustic bio-cell filters; Ultrasonic emulsion splitting; Therapeutic and diagnostic ultrasound; Sonothrombolysis; Sonoporation |
| **Prerequisites** | No prerequisits required. A personal laptop is advantageous, because it allows the use of eclectronic document copies of the provided course material. Hard copy hand-outs of the visual presentations will be provided for all participants. |
| **Course exam** | Short accompanying sample tests. Written and oral examination at the end. |

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|---|---|
| **Course code** | UPM 01 |
| **Course title** | Economic Analysis for Project Management |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | Facultad de Informática. Boadilla del Monte 28660 |
| **City** | Madrid |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Project management, time value of money, net present value, cash flow analysis. |
| **Language** | English |
| **Professor responsible** | June Amillo |
| **Telephone** | +34 91 3367427 |
| **Fax** | +34 91 3367412 |
| **Email** | amillo@fi.upm.es |
| **Participating professors** | Rafael Guadalupe |
| **Number of places** | Minimum: 6, Maximum: 15, Reserved for local students: |
| **Objectives** | Learn to assess the economical worth of a project in real situations considering the price value of money.<br>Understand the differnet techniques used to compare projects and choose among several alternatives.<br>Work out a series of case studies drawn from real situations.<br>Implement these techniques using software financial functions in a computer labfinancial analysis techniques using financial software. |
| **Programme to be followed** | First day: Equivalence and Interest Formulas The time value of money Simple and compound interest Cash-Flows: Equivalence and types The single cash-flow The uniform series cash-flow Other regular cash-flows The uneven cash-flow Nominal and effective interest rates. Computer functions. Case studies. Second day: Present Worth Analysis Payback Period. Benefits and flaws. Present Worth. Criterion and meaning. Variations of present worth analysis. Considering mutually exclusive alternatives. Computer functions. Case studies. Third day: Annual Equivalent Worth Analysis The annual equivalent criterion Unit profit/cost calculation Make or buy decisions Computer functions Case studies Fourth day: Rate of Return Analysis Rate of return: Simple projects. Comparing mutually exclusive alternatives. Incremental analysis. The net investment test for non-simple projects The composite internal rate of return Computer functions Case studies Fifth day: Benefit/cost Ratio Benefit-Cost |

ratios Relation to Present Worth Incremental analysis and mutually exclusive alternatives Case studies in the public sector Review Evaluation: Students will have to carry out the economic analysis of an investment project.

**Prerequisites** None, but familiarity with Excel will be helpful. The course follows another one on Project Management: Planning and Control, but can be taken independently.

**Course exam** Genrate the cash flow of a poject and perform an economic analysis.

| | |
|---|---|
| **Course code** | UPM 13 |
| **Course title** | Market Focus in Food Quality Management |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | EUIT Agícola. Ciudad Universitaria s/n.28040 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Marketing research, quality management, new product development, sensory analysis of food, food safety, functional foods |
| **Language** | English |
| **Professor responsible** | Joaquín Fuentes-Pila Estrada |
| **Telephone** | +34 91 336 5405 |
| **Fax** | + 34 91 336 5406 |
| **Email** | joaquin.fuentespila@upm.es |
| **Participating professors** | Carolina Chaya (Graduate School of Agricultural Engineering, Technical University of Madrid)<br>Joaquín Fuentes-Pila (School of Agricultural Technical Engineering, Technical University of Madrid)<br>José Luis López (Graduate School of Agricultural Engineering, Technical University of Madrid)<br>Rodolfo M. Nayga (College of Agriculture and Life Sciences, Texas A&M University) |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | The objectives of this course are to provide an introduction to the major techniques used for Marketing Research in the food industry, the role of Marketing Research for the development of novel and functional foods, and specific techniques for gathering information on the perception of consumers on the sensory properties of foods |
| **Programme to be followed** | 1) Market Focus in Food Quality ManagementProfessor: Joaquín Fuentes-Pila (Departamento de Estadística y Métodos de Gestión en Agricultura de la UPM)March 9 2009, 9:30-11:30 2) Consumers' Willingness to Pay for Nutritional Labels in EuropeProfessor: Rodolfo Nayga M. Nayga, Jr. (Department of Agricultural Economics of Texas A&M University) March 9 2009, 12:00-14:00 3) Qualitative Techniques for Marketing ResearchProfessor: Joaquín Fuentes-Pila (Departamento de Estadística y Métodos de Gestión en Agricultura de la UPM)March 10 2009, 9:30-11:30 4) Consumer Acceptance of Irradiated Food ProductsProfessor: Rodolfo M. Nayga, Jr. (Department of Agricultural Economics of Texas A&M University) March 10 2009, 12:00-14:00 5) Qualitative Techniques for Marketing ResearchProfessor: Joaquín Fuentes-Pila (Departamento de Estadística y Métodos de Gestión en Agricultura de la UPM) March 11 2009, 9:30-11:30 6) Recent Developments in Sensory Analysis of FoodsProfessor: Carolina Chaya |

(Departamento de Estadística y Métodos de Gestión en Agricultura de la UPM) March 11 2009, 12:00-14:00 7) Quantitative Techniques for Marketing ResearchProfessor: Joaquín Fuentes-Pila (Departamento de Estadística y Métodos de Gestión en Agricultura de la UPM) March 12 2009, 9:30-11:00 8) A Case Study: A Marketing Research Study for a Wine Making CompanyProfessor: José Luis López (Departamento de Economía y Ciencias Sociales Agrarias de la UPM) March 12 2009, 12:00-14:00 9) Quantitative Techniques for Marketing ResearchProfessor: Joaquín Fuentes-Pila (Departamento de Estadística y Métodos de Gestión en Agricultura de la UPM) March 13 2009, 9:30-11:30 10) Assessing the Market for Foods for HealthProfessor: Rodolfo M. Nayga, Jr. (Department of Agricultural Economics of Texas A&M University) March 13 2009, 12:00-14:00 11) TestProfessor: Joaquín Fuentes-Pila (Departamento de Estadística y Métodos de Gestión en Agricultura de la UPM)March 13 2009, 14:00-14:30

**Prerequisites** Students from Agricultural Engineering, Industrial Engineering or Food Technology.

**Course exam** Class participation and written exam

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|---|---|
| **Course code** | UPM14 |
| **Course title** | Accessible Web Design |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | Facultad de Informática. Universidad Politécnica de Madrid.Campus de Montegancedo S/N. 28660 Boadilla del Monte. Madrid (Spain) |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | World Wide Web, Accessibility, Design for All, Inclusive Design, Assistive Technologies, Disabilities |
| **Language** | English |
| **Professor responsible** | Loïc Martínez Normand |
| **Telephone** | +34 91 336 74 11 |
| **Fax** | +34 91 352 63 88 |
| **Email** | loic@fi.upm.es |
| **Participating professors** | José Luis Fuertes Castro (Universidad Politécnica de Madrid. Department: LSIIS)<br>Loïc Martínez Normand (Universidad Politécnica de Madrid. Department: LSIIS)<br>Invited speakers to be confirmed |
| **Number of places** | Minimum: 14, Maximum: 15, Reserved for local students: 0 |
| **Objectives** | • Being aware of web accessibility issues<br>• Understanding the accessibility guidelines of the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C)<br>• Being able to evaluate the accessibility of a Web site<br>• Being able to design a small-sized accessible web site |
| **Programme to be followed** | Brief Description of the Weekly Programme :<br>Introduction: disabilities, independent living, design for all, standards, legislation<br>The Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C)<br>Web Content Accessibility Guidelines (WCAG): guidelines, checkpoints, techniques.<br>Evaluation of Web Accessibility<br>Contents relative to each day:Day 1 (10:00-15:00): · Introduction (lectures). · Visit to CEAPAT (Centre for Personal Autonomy and Assistive Technology). To be confirmed.Day 2 (10:00-17:30): · Introduction to WAI & WCAG (lecture)· WCAG Checkpoints part 1 (lecture)· Start of exercise (laboratory)Day 3 (10:00-17:30):· WCAG Checkpoints part 2 (lecture)· Web Accessibility Evaluation (lecture)· Follow-up of exercise (laboratory)Day 4 · Empty – holiday in SpainDay 5 (10-15): · End of exercise (laboratory) |

· Exercise presentation

Conclusions

**Prerequisites** Knowledge on web design technologies, mainly XHTML and CSS

**Course exam** Based on practical work (consisting of the design of a small accessible web site or the evaluation of the accessibility of a web site)

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|---|---|
| **Course code** | UPM15 |
| **Course title** | Restoration of Fluvial Ecosystems |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI. Montes. Ciudad Universitaria s/n 28040 MADRID |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Restoration Fluvial Ecosystems, Habitat, Riparian Systems, Ecological Aesthetics and Riverine landscape, Bioengineering |
| **Language** | English |
| **Professor responsible** | Diego García de Jalón Lastra |
| **Telephone** | +34 91 336 63 85 / +34 91 336 70 97 |
| **Fax** | +34 91 336 70 93 |
| **Email** | diego.gjalon@upm.es |
| **Participating professors** | Marta GONZALEZ DEL TÁNAGO<br>Ignacio GARCÍA- AMORENA<br>Carlos ALONSO<br>Miguel MARCHAMALO<br>Carolina MARTINEZ<br>Rafael ESCRIBANO<br>Carlos ROMERO<br>Fernando TORRENT<br>Joaquín SOLANA<br>Diego GARCÍA DE JALÓN |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | • To present the state of art on River Restoration.<br>• To analyse and discuss the strategies to fallow and the technics to use in order to recover the good ecological status.<br>• To evaluate examples as case histories in practical field. |
| **Programme to be followed** | • The river and its valley. Geomorphology and Fluvial Dynamics. Natural Flow regime characterization. • Fluvial Ecology. Biological components. Physical requirements for the ecosystem functioning. Aquatic Habitat evaluation • Riparian Systems and Floodplains. Riparian vegetation: composition, structure and function. Riparian Landscapes • Principles on River Restoration. Strategies and Technics on Restoration. Stream degradation: detecting causes. Pollution. Flow Regulation. |

Chanalization. • River Restoration Projects: design, structure and contents. Restoration Plans. Economic analysis. Social and Environmental impacts. • Habitat Improvement technics. Fluvial Simulation Models. • Ecological Aesthetics. Artistic components in River restoration activities. Landscape design. Feelings and perception on Rivers. Cultural hereditage. • Case Histories: River Jarama (restoration), River Manzanares (rehabilitation9 and Arroyo Pozuelo (urban stream cosmetics)

**Prerequisites** Bachelor level in Sciences, Ecology, Forestry, Agronomy,Environomental Engineering, and Civil Engineering

**Course exam** Continuous evaluation through exercises and personal presentations and written exam on last course.

| | |
|---|---|
| **Course code** | UPM16 |
| **Course title** | Environmental and Economic Issues on Pulp and Paper Production |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI Montes.Ciudad Universitaria s/n.28040 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Timber consumption and supply, debarking, mechanical pulping, chemical and semi-chemical pulps, pulp bleaching, water and air pollution, papermaking main inputs. |
| **Language** | English |
| **Professor responsible** | Dr. José L. de Pedro Sanz |
| **Telephone** | +34 913365046 |
| **Fax** | +34 913366386 |
| **Email** | joseluis.depedro@upm.es |
| **Participating professors** | Sigfredo Ortuño Pérez, José V. López Álvarez, Nuria Gómez Hernández, Miguel Aguilar Larrucea, Juan Carlos Villar, Santiago Molina and José Mª Carbajo |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | The main objective will be to familiarize students with the main economic and environmental problems facing today the pulp and paper industry.Two themes of special consideration will be the availability and cost of the timber for woodpulp making as well as the rational use of water in the pulp and paper industries. A third theme will focus on the air pollution caused by the industries and on the best available technologies to cope with the problem. the course will include a visit to research pulp and paper centre in Madrid. |
| **Programme to be followed** | 1.José L. de Pedro Sanz " *The Pulp and Paper Industry and Sustainable Production",* Madrid.March 2006.<br>2.Johan Gullichsen and Hannu Paulapuro, *"Chemical Pulping, Helsinki University of Technology*". Finland 2000<br>3.Christopehr J. Bierman, *" Handbook of Pulping and Papermaking Academic Press".* N.Y.1996<br>4.*" Forest Products YEarbook 2004".* Rome. Italy<br>5. *Mechanical Pulp, Papermaking Science and Technology*. Book 6A. Finland2000 |
| **Prerequisites** | Basic knowledge of economic and enviranmental issues. |
| **Course exam** | Evaluation:class participation in discussions 20%, oral presentations of a selected topic 30% and final test 50%. |

| | |
|---|---|
| **Course code** | UPM20 |
| **Course title** | Spanish Real Estate Economy (Real Estate Crack) / Eonomía de la Promoción Inmobiliaria en España(Catástrofe Inmobiliaria) |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | EU de Arquitectura Técnica. Av/ Juan de Herrera nº6, 28040 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Real Estate, Economy, Spanish regulations |
| **Language** | English |
| **Professor responsible** | Mariano de las Heras y Fernández (Catedrático de Construcciones Arquitectónicas de la UPM) |
| **Telephone** | +34-913367646/7622/7593 |
| **Fax** | +34-913367644/7634 |
| **Email** | mariano.delasheras@upm.es, erasmus.arquitecturatecnica@upm.es |
| **Participating professors** | Mariano de las Heras y Fernández (Catedrático)<br>Trinidad Fernández Pérez (Profesora Titular)<br>Pedro Hernando Zapata (Profesor Invitado)<br>Ebrul Mahamud Angulo (Profesor Invitado)<br>Nieves Navarro Cano (Profesora Titular)<br>Carlos Nieto Gómez (Profesor Invitado)<br>Joaquín Santiago López (Profesor Titular)<br>Mercedes Valiente López (Catedrática). |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | • To present the state of art on real estate in Spain.<br>• To analyse and discuss the economy of real estate in Spain.<br>• To evaluate examples of real estate in Spain.<br>• To conclude about the real estate market in Spain |
| **Programme to be followed** | • General real estate concepts.<br>• Spanish real estate regulations.<br>• Economics real estate variables.<br>• Concepts of economic real estate balance.<br>• Meeting about Spanish real estate world |
| **Prerequisites** | Bachelor level in Sciences, Environmental Engineering and Civil Engineering, Real Estate Professionals, Architecturing, Civil Engineering |

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|---|---|
| **Course exam** | Continuous evaluation through exercises and personal presentations and written exam on last course day |

| | |
|---|---|
| **Course code** | UPM 26 |
| **Course title** | Antenna Design and Measurement Techniques |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI Telecomunicación. Ciudad Universitaria |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Antenna, radiation pattern, array, coupling, reflection, S parameters, prototype, simulation software, PNA, anechoic chamber, far field, near field… |
| **Language** | English |
| **Professor responsible** | Dr. Manuel Sierra Castañer |
| **Telephone** | +34 913367366- ext 4053 |
| **Fax** | +34 915432002 |
| **Email** | m.sierra.castaner@gr.ssr.upm.es |
| **Participating professors** | Manuel Sierra Castañer, Fernando Martín, Pablo Padilla, José Manuel Fernández, Sara Burgos, Jonathan Mora, Carlos Gómez Calero . Dpto. Señales, Sistemas y Radiocomunicaciones. Grupo de Radiación |
| **Number of places** | Minimum: 4, Maximum: 15, Reserved for local students: |
| **Objectives** | The aim of this short course is to familiarize students with antennas, in a quite practical way. Students will acquire knowledge about all the main aspects of designing and measuring antennas.<br>The course is divided into two different parts: Antenna Design, signal Processing in Antennas and Antenna Measurement.<br>In the Antenna Design Part, students are going to deal with concepts and tools quite useful for antenna design and prototyping.<br>In the second part, a brief introduction to smart antennas and MIMO systems is performed.<br>In the Antenna Measurement Part, students are going to get used to the different measuring techniques. The course will include a visit to an Anechoic Chamber.<br>At the end of the course, the student will be able to understand the main aspects that antenna designs and antenna measurements imply. |
| **Programme to be followed** | 1- Introduction (Manuel Sierra Castañer)<br>2- Antenna analysis, design and manufacture (José Manuel Fernández and Pablo Padilla)<br>2.1- Antenna theory<br>2.2- Simulation software<br>2.3- Design and Prototyping |

3- Signal Processing in antennas(Carlos Gómez and Jonathan Mora)

3.1- Smart Antennas

3.2- MIMO systems

4- Antenna measurements (Fernando Martín and Sara Burgos)

4.1- Theory

4.2- Anechoic chamber measurements.

**Prerequisites** Basic knowledge of electromagnetic fields and signal processing issues.

**Course exam** Evaluation: class participation 40%, and final test 60%.

| | |
|---|---|
| **Course code** | UPM28 |
| **Course title** | Cartography, Internet GIS and SDIs Supporting Engineering and Research Projects |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI Topografía Geodesia y Cartografía. Ctra Valencia Km7.5. 28031 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Cartography, Webmapping, GIS, Internet; OGC Services, SDIs. |
| **Language** | English |
| **Professor responsible** | Rufino Pérez Gómez |
| **Telephone** | +34 91 336 79 21 |
| **Fax** | +34 91 332 25 60 |
| **Email** | rufino@topografia.upm.es |
| **Participating professors** | Rufino Pérez Gómez<br>José Fabrega Golpe |
| **Number of places** | Minimum: 8, Maximum: 15, Reserved for local students: |
| **Objectives** | The main objective of this course is to explain how Cartography, GIS, Internet and Spatial Data Infrastructures (SDIs) concepts and tools can interact and work together to undertake complex spatial and temporal analysis in the framework of the engineering and research projects. The course includes many practical exercises to illustrate how all these geo-related technologies are implemented and used. |
| **Programme to be followed** | The program includes different topics such as the Geoinformation related technologies, the use of Geographical Information Systems (GIS) for modeling analysis and mapping, Internet GIS, the Spatial Data Infrastructures (SDIs) and the integration of Internet GIS projects with Spatial Data Infrastructures (SDIs) via OGC Services. (see detailed program for more information). |
| **Prerequisites** | Students with basic knowledge in mapping and computer programs (OS, word processor, CAD, etc). This course is NOT intended for programmers or computer sciences specialist. This course is designed and better suited for students from Engineering or Geosciences thematic areas where complex spatial analysis is often required in their projects or professional activities. |
| **Course exam** | Continued evaluation (attendance of classes, participation on debates, practical exercises, technical visits, etc) plus assessment of a final work that will be carry out at home and submitted to the Professor via e-mail one month after the end of the course |

| | |
|---|---|
| **Course code** | UPM30 |
| **Course title** | Industrial Utilization of Aromatic and Medicinal Plants |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI Montes.Ciudad Universitaria s/n.28040 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Aromatic plants, medicinal plants, essential oil, extracts |
| **Language** | English |
| **Professor responsible** | Mª Paz Arraiza Bermúdez-Cañete |
| **Telephone** | +34 91 336 63 80 |
| **Fax** | +34 91 336 63 86 |
| **Email** | paz.arraiza@upm.es |
| **Participating professors** | M. Paz Arraiza<br>J. L. de Pedro<br>C. Arrabal<br>G. Martín Muñoz |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | Medicinal and aromatic plants (MAPs) represent a relatively new area of horticultural education with considerable student and grower interest.<br>Emphasis has been focused on establishing a fundamental understanding of the tradition and science that envelops medicinal and aromatic plant materials and building foundations in horticulture, ethnobotany, chemistry, plant identification, and applications related to medicinal and aromatic plants.<br>The course provides the BASSIC knowledge of medicinal plants, drugs, their active principles and relative extraction, identification and stability, together with the skills for the management, transformation and use of officinal plants and their derivatives.. |
| **Programme to be followed** | **Unit 1.** Introduction. Concepts. Definitions. History. Classification.<br>**Unit 2.** Raw Material and plant processing. Cultivation, harvesting, drying and transformation of raw material.<br>**Unit 3.** Active principles in MAPs. Essential oils. Extracts. Alkaloids, Glycosides, Bitter compounds, Tannins, Essential oils, Terpenes, Resins, Mucilage, Pectin, Carotenes.<br>**Unit 4.** Chemical Analysis of MAPs. Quality Control. Distillation. Extraction. Gas and Liquid Chromatography.<br>**Unit 5.** Industrial utilization of MAPs. Pharmacology. Phytotherapy. Homeopathy. Aromatherapy. |

Wine and spirits. Perfumery and cosmetics.

**Unit 6**. MAPs from tropical forests of Africa and South America.

**Prerequisites** None

**Course exam** Course Participation

Written exam and end of course.

| | |
|---|---|
| **Course code** | UPM33 |
| **Course title** | Ontologies and the Semantic Web |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | Facultad de Informática. Boadilla del Monte 28660 |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Ontology, Semantic Web, RDF(S), OWL |
| **Language** | English |
| **Professor responsible** | María del Carmen Suárez de Figueroa Baonza |
| **Telephone** | +34 91 336 36 72 |
| **Fax** | +34 91 352 48 19 |
| **Email** | mcsuarez@fi.upm.es |
| **Participating professors** | Asunción Gómez-Pérez<br>Oscar Corcho García<br>Raúl García-Castro<br>María del Carmen Suárez de Figueroa Baonza |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | The general objective is to provide students with a sound grounding of scientific, methodological and technological fundamentals in the Semantic Web domain that will be later used to build applications that can integrate, combine and infer heterogeneous and distributed information. |
| **Programme to be followed** | This course is organized in three sections and an oral presentation, with a total of 20 hours (plus 5 hours that will be devoted to a social event). For each section, we specify the amount of time devoted to theoretical lessons and to hands-on activities. Each section is composed of several units. **Section 1: Introduction to the Semantic Web (theory: 1 hour)**Unit 1. (1 hour) General overview of the semantic web with special emphasis on ontologies and resources annotation (documents, texts, web pages, web services, DBs, etc). Description of the types of problems this technology can be applied to. **Section 2. Ontologies (theory: 8 hours, hands-on: 8 hours)**Unit 2. (2 hours) Theoretical aspects: definition, scope, types of ontologies, ontology repositories. Unit 3. (2 hours) Languages used in ontology implementation: (RDF(S) and OWL) as well as query languages: SPARQL.Unit 4. (2 hours) Tools used in building and storing ontologies (Sesame, Jena, Protégé, NeOn toolkit) as well as in ontology reasoning (Pellet, Racer). Unit 5. (2 hours) Life cycles and development methodologies used in building ontologies and ontology networks through collaborative work. **Section 3. Applications in the Semantic Web (theory: 1 hour)**Unit 6. (1 hour) Applications using semantic |

web technologies that have been built in national and European projects in different domains (e-commerce, knowledge management, semantic portals, etc.).

To allow students to consolidate knowledge and skills acquired throughout the course some assignments related to each unit have been designed. Students will work in pairs and all the coursework to be done will be related to a specific domain. That domain will be agreed by the teacher and the students. The aim is to enable students to apply the knowledge acquired in the course in order to face new situations and solve real problems. Thus, students will be well prepared to adapt to the continuous technological evolution in this field.

**Prerequisites**

It is highly recommendable to have attained a certain level in the following subjects and technologies, as they will not be explained in the classes.

Knowledge representation systems: frames, semantic networks and description logics

Web Technologies: HTML, XML, etc.

Java and JDBC

**Course exam**

Students will be evaluated on the basis of a presentation that they must make of the work that compiles the coursework carried out.

We have reserved 2 hours for this activity, in the end of the course.

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|---|---|
| **Course code** | UPM35 |
| **Course title** | New Technologies in old sciences: Mapping & Archaeology |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI Topografía Geodesia y Cartografía. Ctra Valencia Km7.5. 28031 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Mapping, technology, archaeology, heritage |
| **Language** | English |
| **Professor responsible** | Prof. Mercedes Farjas |
| **Telephone** | +34 629 158633 |
| **Fax** | + 34 91 3322560 |
| **Email** | m.farjas@upm.es |
| **Participating professors** | Harald Sternberg, Carlos Acevedo, Völker Böder, Miguel Alonso, Thomas Shramm |
| **Number of places** | Minimum: 3, Maximum: 10, Reserved for local students: |
| **Objectives** | The course should give a comprehensive introduction into the status, tecnologies, impactsand perspectives of technologies applied in over- and underwater Heritage modeling |
| **Programme to be followed** | The objectives of this course is to provide the basic background in adquisition of heritage documentation data by new technologies. The course has a total duration of 30 hours divided by 2 modules of 15 hours each. The first one provide students the opportunity for study modeling of archaeological objects or heritage monuments. The second one introduce the student to underwater technologies that could be applied in heritage..Module I: To provide students with the ability to project and implement laser scanning technology applied in Archaeology and Heritage. To achieve this goal the course is based on the project teaching methodology. 1) Project planning. 2) Adquisition of data design. 3) Laser scanner equipment. 4) Laser scanning process. 5) Reference network. 6) Data processing: RealWorks Survey 5.0 o LFM Modeller. 7) Modeling: RealWorks Survey 5,0 ó LFM Modeller. 8) Visualitation: AutoCAD 2007 y VIZ 2007.Module II: The main objective is to provide perspectives on underwater mapping technology .1) Hydrography aims. 2)Reference systems. 3) Tides. 4) Hydrography measuremt methodology. 5) Processing and analysis of data. 6. Final results and conclusions. |
| **Prerequisites** | Basic knowledge of mapping. |
| **Course exam** | Final report |

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|---|---|
| **Course code** | UPM40 |
| **Course title** | GPS and GIS used in coastal cartography |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI Caminos, Canales y Puertos. Ciudad Universitaria. 28040 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | GPS, GIS, bathymetry, beach evolution, cartography |
| **Language** | English |
| **Professor responsible** | José Luis Almazán Gárate |
| **Telephone** | +34 91 559 1205 |
| **Fax** | +34 91 559 21 08 |
| **Email** | joseluis.almazan@upm.es |
| **Participating professors** | José Luis Almazán Gárate<br>M. Carmen Palomino Monzón<br>José Raúl García Montes |
| **Number of places** | Minimum: 15, Maximum: 15, Reserved for local students: |
| **Objectives** | Nowadays, considering the increasing use of new technologies, the use of satellite positioning is very regular concerning topography and geodesy at any level (from civil engineering to any kind of georeferenced stocktaking).All that along with the modern survey units makes posible to carry out bathymetries both in beaches and coasts precisely in a brief period of time. Also, the increasing use of GIS, which are capable of managing all those data to be analysed afterwards using data bases and graphyc tools, makes this method the best to operate and launch data.In this manner, students will know the latest about all these GPS, GIS and survey techniques. Also, thanks to a high percentage of practice of this course, they will be able to get in touch with many types of devices and software concerning these areas |
| **Programme to be followed** | Introduction. Basic concepts, history, markets and applications.GPS. Analysis of several techniques and devices.GIS. Software available and its applications.Coastal dynamics in beaches.Survey making.GPS-GIS linking.Making of a case study |
| **Prerequisites** | Basic knowledge on computing and coastal engineering |
| **Course exam** | Evaluation through the making of a case study |

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|---|---|
| **Course code** | UPM41 |
| **Course title** | CFD workshop |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI Navales. Ciudad Universitaria s/n.28040 |
| **City** | Madrid |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | CFD, grid generation, RANS, finite elements, panel methods |
| **Language** | English |
| **Professor responsible** | Antonio Souto Iglesias |
| **Telephone** | +34 91 336 7156 |
| **Fax** | +34 91 544 2149 |
| **Email** | antonio.souto@upm.es |
| **Participating professors** | Antonio Souto-Iglesias[1]<br>Leo González Gutiérrez[1]<br>Juan Miguel Sánchez Sánchez[1]<br>Jorge Izquierdo Yerón[1]<br>1Naval Architecture Department (ETSIN), Technical University of Madrid |
| **Number of places** | Minimum: 5, Maximum: 15, Reserved for local students: |
| **Objectives** | The objectives of this course are to provide a practical introduction to the use of CFD codes in Engineering. The students will acquire skills in modelling and meshing 3D geometries which they will use to run panel method codes for the computation of the potential flow around a body (with special attention to problems with a free surface) and finite element codes for the computation of the viscous flow. |
| **Programme to be followed** | 0) Outline of the courseProfessor: Antonio Souto-IglesiasMonday March16 th 2008, 10:30-11:00 1) Introduction to Panel MethodsProfessor: Juan Miguel SanchezMonday March 16th 2008, 11:00-13:00 2) 3D Panel methodsProfessor: Antonio Souto-IglesiasMonday March 16th 2008, 13:00-13:30 Monday March16th 2008, 14:30-16:30 Tuesday March 17th 2008, 9:30-11:30 3) 3D Panel methods with Free SurfaceProfessor: Antonio Souto-IglesiasTuesday March 17th 2008, 11:30-13:30 Tuesday March 17th 2008, 14:30-16:30Wednesday March18th 2008, 9:30-11:30 4) Introduction to Finite ElementsProfessor: Leo González GutiérrezWednesday March 18th 2008, 11:30-13:30 5) Transport and DiffusionProfessor: Leo González GutiérrezWednesday March18th 2008, 14:30-16:30 6) 2D Finite ElementsProfessor: Leo Gonzalez GutiérrezThursday March 19th 2008, 9:30-13:30 7) 3D Finite ElementsProfessor: Leo Gonzalez GutiérrezThursday March 19th 2008, 14:30-16:30 Friday |

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| | March 20th 2008, 10:30-13:30 |
| **Prerequisites** | Students of Engineering, Physics, Mathematics, and the likes |
| **Course exam** | The students marks will be based on their ability to do the exercises proposed during the workshop. Attendance to all the sessions will be compulsory |

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|---|---|
| **Course code** | UPM42 |
| **Course title** | Space systems engineering, Mission analysis and project management |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI Telecomunicación. Ciudad Universitaria |
| **City** | Madrid |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Telecommunications Satellites, On Board Processing, Switching, On Board subsystems trends. Mission Analysis and Management |
| **Language** | English |
| **Professor responsible** | Salvador Landeros Ayala |
| **Telephone** | +34 627341370 |
| **Fax** | +34 91 336 7262 |
| **Email** | slanderos@etsit.upm.es |
| **Participating professors** | Salvador Landeros Ayala |
| **Number of places** | Minimum: 5, Maximum: 15, Reserved for local students: |
| **Objectives** | Students will have a general vision about an entire telecommunications satellite engineering project |
| **Programme to be followed** | On board processing and regenerative repeaters; Technological trends in Electrical, thermal, attitude, propulsion and TTC subsystems. Mission analysis and project management |
| **Prerequisites** | Satellite Communications studies (either a full course or a part course) |
| **Course exam** | Final exam 100% |

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|---|---|
| **Course code** | UPM44 |
| **Course title** | Harbours, littoral and development |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETS Ingenieros de Caminos, Canales y Puertos. Ciudad Universitaria.28040 |
| **City** | Madrid |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Coastal Management, development, environmental. |
| **Language** | English |
| **Professor responsible** | Pedro Fernández Carrasco |
| **Telephone** | +34 620115854 +34 913366734 +34913366757 ex 20 |
| **Fax** | +34 91 336 67 34 |
| **Email** | pfernandez@caminos.upm.es |
| **Participating professors** | Pedro Fernández Carrasco |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | Highlight the link between harbours, sea side and development |
| **Programme to be followed** | Cities and harbours, littoral pressure, coastal model development, environmental impact, stereotype and coastal development, Cooperation and littoral. |
| | **Possible trip for practic work, possible extra fee (to be confirmed)** |
| **Prerequisites** | Civil engineer, Environmental, Law, Tourist, coastal management |
| **Course exam** | Group work, oral presentation, class participation |

| | |
|---|---|
| **Course code** | UPM 45 |
| **Course title** | TRANSLATION OF TECHNICAL TEXTS, TERMINOLOGY SKILLS AND DOCUMENTATION |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI NAVALES Arco de la Victoria s/n 28040 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | TRANSLATION, ENGLISH, SPANISH, TERMINOLOGY |
| **Language** | English and Spanish |
| **Professor responsible** | Silvia Molina Plaza |
| **Telephone** | +34 91 5046079 |
| **Fax** | +34 91 5442143 |
| **Email** | silvia.molina@upm.es |
| **Participating professors** | Silvia Molina Plaza + 1 teacher from the Dpto de Lingüística Aplicada a la Ciencia y Tecnología (to be confirmed) |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | The course offers participants the opportunity to develop students' translation and language skills, to deepen their understanding of the workings of language as an essential tool of communication and to gain vital experience in the rapidly developing area of translation technology. As a participant of the programme you will be equipped with the practical competence needed for professional work in the fields of translation and software localisation and for research work in translation studies. Moreover, the focus on scientific and technical translation together with the emphasis on computational tools and translation practice from English into Spanish makes this course a hands-on experience about translating technical and scientific texts from different genres. Translators work on the widest possible variety of material, ranging from medical reports and research papers, through parliamentary proceedings, patents and product documentation, to publicity material, web pages and software.<br><br>Many major translation projects are undertaken as a team effort, with a single set of documents often being translated simultaneously into Spanish with the aid of shared electronic resources and translation tools.Participants are introduced to the wide range of knowledges, skills and methodologies necessary for researching and producing high-quality translations of a technical, specialist nature. |
| **Programme to be followed** | **1. Scientific and Technical language. 2. An Overview of Scientific and Technical Translation: basic concepts and procedures. Translation practice3. Terminology in Technical** |

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|---|---|
| | **Translation4. General translation: booklets, scientific reviews and articles, books for the lay person. 5. Specialized translation: manuals, case studies, abstracts. 6. Editing processes.** · . |
| **Prerequisites** | A1 LEVEL IN ENGLISH AND A1 LEVEL IN SPANISH. |
| **Course exam** | Evaluation will take place through the translation exercises in class |

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|---|---|
| **Course code** | UPM 46 |
| **Course title** | Introduction to computational aeroelasticity |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI AeronáuticosPlaza del Cardenal Cisneros, 4; 28040 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Aeroelasticity |
| **Language** | English |
| **Professor responsible** | Jesús López Díez |
| **Telephone** | +34 91 336 6357 |
| **Fax** | +34 91 336 6366 |
| **Email** | jesus.lopez.diez@upm.es |
| **Participating professors** | Jesús López Díez<br>Marcos Chimeno<br>(ETSI Aeronáuticos, UPM) |
| **Number of places** | Minimum: 10, Maximum: 10, Reserved for local students: |
| **Objectives** | Introduction to aeroelasticity;Aeroelastic models for flutter estimation |
| **Programme to be followed** | Introduction to aeroelasticityPrinciples, Definitions, Physical description of aeroelastic phenomenaStatic and dynamic aeroelasticity. Formulation 1Introduction to NASTRAN. Aeroelastic preference 1Static aeroelasticity. Model development with a computer codeDynamic aeroelasticity. Model development with a computer codeAeroelasticity of turbomachineryLaboratory work. Demostration of flutter. |
| **Prerequisites** | Basic structure and aerodynamic courses |
| **Course exam** | Assistance and classroom work |

| | |
|---|---|
| **Course code** | UPM 47 |
| **Course title** | ROBOTICS |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | Escuela Universitaria de Informática. Ctra. Valencia km. 7. 28031 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Industrial robotics, mobile robotics, manufacturing, robotic sensors, intelligent vehicles, GPS |
| **Language** | English |
| **Professor responsible** | José Eugenio Naranjo |
| **Telephone** | +34 91 3013029 |
| **Fax** | +34 91 3367522 |
| **Email** | joseeugenio.naranjo@upm.es |
| **Participating professors** | José Gabriel Zato Recellado<br>José Eugenio Naranjo<br>Luis Redondo López |
| **Number of places** | Minimum: 3, Maximum: 15, Reserved for local students: |
| **Objectives** | This course focuses in describing introductory concepts of Robotics field, centering in industrial robotics and manufacturing and mobile robotics, including sensors and actuators. This subject will be complemented with practices using a robotics simulator: Microsoft Robotics Studio |
| **Programme to be followed** | Chapter 1. Introduction to robotics1.1. Generalities and history.1.2. Industrial Robotics1.3. Manipulators1.4. Industrial plant control: SCADA1.5. Mobile RoboticsChapter 3. Practice 1 description: Microsoft Robotics Studio. ManipulatorChapter 4. Robotics in manufacturing. Visit to CETEMA4.1. Tool-Machine4.2. Coordination among machines4.3. SCADAChapter 6. Mobile robotics6.1. Control paradigms6.2. Example of robots6.3. Autonomous vehicles6.4. Walking robots6.5. RobosoccerChapter 7. Sensors used in robots7.1. Sensors in manipulators7.2. Sensors in manufacturing7.3. Sensors in mobile robotics7.4. Sensors in autonomous vehiclesChapter 8. Practice 2 description: Microsoft Robotics Studio. Mobile robotChapter 9. GPS as outdoor sensorChapter 10. Industrial communication networks10.1. CAN10.2. ProfiBus10.3. Interbus |
| **Prerequisites** | None |
| **Course exam** | One practical work on simulated mobile robots using Microsoft Robotics Studio. |

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|---|---|
| **Course code** | UPM 48 |
| **Course title** | One week / one competition |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSAM/ Juan Herrera Avenue |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Data searching/ Análysis data processing /Design strategies /figuration and modelization/ Criticism. |
| **Language** | English |
| **Professor responsible** | Atxu Amann y Alcocer |
| **Telephone** | +34 629228580 |
| **Fax** | +34 913070667 |
| **Email** | andresyatxu@yahoo.es |
| **Participating professors** | |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | To state specifically the phases in creative processes, and the actions and tools linked with them.Application to competition processes through an architectonic real case. |
| **Programme to be followed** | Outdoors data searching/indoors work and cryticism sessions. ( in groups) |
| **Prerequisites** | **Architecture students/Computer/ programmes to manipulate and generate images/digital camera/ video camera** |
| **Course exam** | Final co-evaluation |

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|---|---|
| **Course code** | UPM 49 |
| **Course title** | Forestry and forest products in tropical areas |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETS Ingenieros de Montes |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Silviculture, reforestation, timber production, tropics |
| **Language** | English |
| **Professor responsible** | Juan A. Oliet Palá |
| **Telephone** | +34 91 336 7130 |
| **Fax** | +34 91 336 5033 |
| **Email** | juan.oliet@upm.es |
| **Participating professors** | Juan A. Oliet PaláDouglass F. JacobsCarlos Morla JuaristiIgnacio García-Amorena Gomez del Moral<br>Eduardo Tolosana Esteban<br>Isaac Martínez Rojas |
| **Number of places** | Minimum: 15, Maximum: 15, Reserved for local students: |
| **Objectives** | Overview of tropical forest ecology and management mainly focused on development aid and cooperation |
| **Programme to be followed** | BLOQUE 1 Introduction to the Earths vegetation. Vegetation zones and driving factors. Tropical, subtropical and desert Biomes. Net primary productions. Dominant strategies in aquatic and terrestrial communities. Forests products.<br>BLOQUE 2 Forest plantations in tropical areas: importance in a global context. Nursery practices and plantation forestry in the tropics: seedling production, reforestation techniques and caring during first establishment. Thinning and pruning for timber production. Rotation choosing. BLOQUE 3 Forest harvesting in tropical and subtropical areas. Manufacturing techniques and low-impact techniques. Basic techniques of sawing. The problem of firewood. Charcoal making. |
| **Prerequisites** | Undergraduate students of Forestry, Biology, and Agronomy |
| **Course exam** | Final test |

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|---|---|
| **Course code** | UPM 50 |
| **Course title** | A generic approach to the vegetation of Spain (Iberian territory, Balearic and Canary Islands) and the understanding of human impact throughout history |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | EUIT Forestal. ciudad universitaría s/n. 28040. Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Vegetation, Spain, Iberian Peninsula, Balearic Islands, Canary Islands, Human use, Impact |
| **Language** | English |
| **Professor responsible** | César López Leiva |
| **Telephone** | +34 913367549 – 913367669 |
| **Fax** | |
| **Email** | cesar.lopez@upm.es |
| **Participating professors** | César López Leiva, PTEUJuan Ignacio García Viñas, PTEUAitor Gastón González, P Asoc |
| **Number of places** | Minimum: 10, Maximum: 15, Reserved for local students: |
| **Objectives** | Provide a proper undestanding of diversity of phytocenoses and vegetal landscapes and the way they are geographically distributed in Spain, with special mention to mediterranean communities (forests, shrublands and grasslands) and singular covers (intrazonal and macaronesic – canarian- islands).<br>Identification of most significative vegetal units, taking into account botanical composition, vertical and horizontal structures, evolutive dynamics (maturity level, stability) and indicator plants and traits.<br>Interpretation of causes that have determined and still influence the occurrence and distribution of current landscapes in Spain and the historical dynamics of phytogeographic evolution, highlighting human uses impact.<br>Show different approaches and methodologies for the analysis of vegetation covers and phytosociological relationship |
| **Programme to be followed** | 1.- The vegetation of Spain (Iberian Pen. and Balearic Isl.) (I). Introduction 2.- The vegetation of Spain (Iberian Pen. and Balearic Isl.) (II). High mountain ranges and montanous needleleaved forests domain. 3.- The vegetation of Spain (Iberian Pen. and Balearic Isl.) (III). Deciduous and Subsclerophyll Forests domains 4.- The vegetation of Spain (Iberian Pen. and Balearic Isl.) (IV). Esclerophyll Forests and Hyperxerophile vegetation Domains. 5.- The vegetation of Spain (Iberian |

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| | Pen. and Balearic Isl.) (V). Intrazonal vegetation 6.- The vegetation of Canary Islands 7.- The vegetation of the Spanish main mountain ranges 8- Review |
| **Prerequisites** | Students of Forestry Schools, Biology, Environmental and similar sciences having **basic** knowledge of Systematic Botany and European phytogeography |
| **Course exam** | Written and on-line tests |

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|---|---|
| **Course code** | UPM 51 |
| **Course title** | Cybersociety: myths and contradictions |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | EUITT. Ctra. Valencia, Km.7 28031 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Society, Sociology, Democracy, Myths, Prospective, Future control |
| **Language** | English |
| **Professor responsible** | Pedro Costa Morata |
| **Telephone** | +34 91 336 7821 |
| **Fax** | +34 91 331 9229 |
| **Email** | pcosta@euitt.upm.es |
| **Participating professors** | Eloy Portillo Aldana |
| **Number of places** | Minimum: 5, Maximum: 15, Reserved for local students: |
| **Objectives** | The course proposes the students a reflection about the most ambiguous, negative and controversial aspects of the "cybersociety". The following analysis will be made about:<br>A mythical element, ever-present in several aspects of the "cybereality", both in the usual approaches, that aim at universal consensus, and also ever-present in some aspects of the professional life.<br>The present and future contradictions between aspirations and reality, both in the development of the "cybersociety" but also in its framework, that is the global society, the domestic and foreign policy, the general economic process… |
| **Programme to be followed** | - The myth in the technological process- From the technological determinism to the social contradictions- The telecommunications and their privileged social status- The "cybersociety's" ghosts: freedom, security and democracy- Time and space minimization: the empire of speed |
| **Prerequisites** | |
| **Course exam** | Continued evaluation (attendance of classes, participation) and a final work about one of the developed topics. |

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|---|---|
| **Course code** | UPM 52 |
| **Course title** | Optical Communication Systems |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | EUITT. Ctra. Valencia, Km.7 28031 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Optic fiber, laser, photodetector, optical network, optical modulation |
| **Language** | English |
| **Professor responsible** | Carlos Rueda Frías |
| **Telephone** | +34-91-336 55 01 |
| **Fax** | +34-91-336 7784 |
| **Email** | carlos.rueda.frias@upm.es |
| **Participating professors** | Miguel Ángel del Casar Tenorio; José María Rodríguez Martín |
| **Number of places** | Minimum: 5, Maximum: 15, Reserved for local students: |
| **Objectives** | The objectives of this course are to provide the basic concepts related to the optical communication. Students should be able to design a whole system and to have an overview of the different optical devices involved. |
| **Programme to be followed** | - Overview of the Optical Communication Systems- Fibre Optics- Optical Emitters- Optical Receivers- Optical Modulation Techniques- Multiplexing Methods- Optical Devices- System Considerations- Optical Networks |
| **Prerequisites** | Basic knowledge of physics, mathematics, electromagnetic waves and transmission theory |
| **Course exam** | An evaluation test at the end of the course |

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| **Course code** | UPM 53 |
| **Course title** | Introduction to Information Technology Risk Management |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | EUITT. Ctra. Valencia, Km.7 28031 Madrid |
| **City** | Madrid |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Risk, Systems, Networks, security, management, administration |
| **Language** | English |
| **Professor responsible** | David Meltzer |
| **Telephone** | +34 91 336 55 28 |
| **Fax** | +34 91 336 7817 |
| **Email** | dmeltzer@diatel.upm.es |
| **Participating professors** | Vicente Hernández, José Fernán Martínez |
| **Number of places** | Minimum: 12, Maximum: 15, Reserved for local students: |
| **Objectives** | A growing number of organizations rely on IT infrastructures for their daily operations. This mix of networks, computers and software support increasingly complex architectures that need to be managed and need their risks to be known, mitigated or eliminated. This course gives and introduction to IT risk management for IT engineers and engineers-to-be, bringing awareness about the main risks related to management and administration of IT infrastructures. |
| **Programme to be followed** | This 5 days course includes lectures on selected IT subjects, hands-on laboratory experiences and an eventual visit to an Internet Service Provider.The main thematic areas of the lectures and/or laboratory experiences are: - IT Security Risk Management - Systems security administration - Network security administration - IT infrastructure monitoring - Intrusion detection |
| **Prerequisites** | This course is intended for last year engineering students and graduate professionals in IT engineering areas with: - Interest in networks and systems management - Good English listening, verbal and read skills |
| **Course exam** | The evaluation of the course will be performed considering: - the involvement and participation shown during the course and - the results of a multiple choice test exam that will take place at the end of the course |

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|---|---|
| **Course code** | UPM 54 |
| **Course title** | Math Matters: Introduction to Scientific Computing using Problem Solving Environments for Engineers |
| **Institution** | Universidad Politecnica de Madrid |
| **Course address** | ETSI en Topografía, Geodesia y Cartografía-UPM |
| **City** | Madrid |
| **Minimum year of study** | 2nd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Scientific computing, engineering mathematics |
| **Language** | English |
| **Professor responsible** | Mercedes Farjas |
| **Telephone** | + 34 629 158633 |
| **Fax** | + 34 91 3367928 |
| **Email** | m.farjas@upm.es |
| **Participating professors** | Thomas Schramm, Carlos Acevedo |
| **Number of places** | Minimum: 3, Maximum: 20, Reserved for local students: |
| **Objectives** | The course should give a comprehensive introduction into the use of computeralgebra- and numerical computer environments. Using the state-of-the-art systems Maple and Matlab as example, we show how to use symbolic numerical methods in a synergetic way to solve engineering proplems. |
| **Programme to be followed** | The course has a total duration of 30 hours. The main themes for the four days are: 1) Introduction to the computeralgebra-system Maple. 2) Introduction to the numerical system Matlab. 3) Numbolics: a synthesis of symbolic and numerical methods. 4) Selected examples from geodesy, surveying. Alternatively, we can analyse exemplaric math-problems of the course participants and try to solve them. |
| **Prerequisites** | Basic knowledge of (linear) algebra and calculus |
| **Course exam** | Final report |

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|---|---|
| **Course code** | WUT3 |
| **Course title** | Ethical Aspects of Research and Engineering |
| **Institution** | Warsaw University of Technology |
| **Course address** | WUT, Nowowiejska 15/19, 00 665 Warsaw, Poland |
| **City** | Warsaw, Poland |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Ethics, R&D ethics, information process, intellectual property, IT usage |
| **Language** | English |
| **Professor responsible** | Roman Z. Morawski |
| **Telephone** | + 48 22 234 7721 |
| **Fax** | + 48 22 825 3769 |
| **Email** | r.morawski@ire.pw.edu.pl |
| **Participating professors** | |
| **Number of places** | Minimum: 10, Maximum: 30, Reserved for local students: 0 |
| **Objectives** | 1. General formation-related objectives:<br>to make students sensitive to moral values related to R&D;<br>to prepare students for undertaking the responsibility for ethical quality of R&D activities;<br>to prepare students for resolving ethical dilemmas that appear in R&D practice;<br>to help students in developing individual personal ethical stance with respect to R&D issues.<br>2. Knowledge-related objectives:<br>to extend basic knowledge concerning general ethics as a philosophical discipline;<br>to identify ethical issues related to R&D activities;<br>to introduce the methodology of resolving ethical dilemmas related to R&D activities.<br>3. Skills-related objectives:<br>to enhance skills of critical analysis of ethical aspects of R&D activities;<br>to enhance skills of discussing and defending one's own ethical stance;<br>to encourage students to develop habits of continual reflection over ethical aspects of their every-day activities. |
| **Programme to be followed** | **Lecture Contents:**<br>1. Elements of meta-ethics and general ethics (4 h)<br>the definition of ethics, and the structure of ethics as a philosophical discipline;<br>the definition of meta-ethics as the methodology of ethics; |

the historical development of ethics;

the relation of ethics to other philosophical disciplines;

the relation of ethics to law, religion and etiquette;

the relation of ethics to psychology, sociology and other social sciences.

2. Methodological background of R&D ethics (2 h)

the definitions of truth and their ethical consequences;

the crisis of truth in the postmodern culture;

the naïve concept of scientific method and its criticism;

the epistemological status of mathematical modelling and measurement.

3. Ethical aspects of principal R&D activities (4 h)

- the choice of a research problem or of a design object;
- ethical aspects of the choice of an R&D methodology;
- ethical aspects of the design and execution of experiments and tests;
- ethical aspects of the acquisition and processing of experimental data;
- ethical aspects of the experimentation and testing with the involvement of live organisms;
- the evolution of R&D ethics;
- an example of a R&D-related ethical dilemma.

4. Ethical aspects of information processes (4 h)

- the definition of an information process;
- ethical issues related to the scientific or technical discussion;
- ethical issues related to the publication of R&D results;
- ethical issues related to the reviewing process;
- ethical issues related to grant applications.

5. Protection of intellectual property – legal and ethical aspects (2 h)

- ethical issues related to legal protection of author's rights;
- ethical issues related to patenting;
- an ethical argumentation against legal protection of material rights.

6. Ethical aspects of using information technologies (ITs) (2 h)

- a classification of ethical issues related to IT usage;
- a basic approach of ethical problems related to IT usage;
- the netiquette or internet ethics and its relation to the journalists ethics;
- ethical dilemmas related to IT usage.

7. Summary and conclusions (2 h)

7. Class test (2 h) **Scope of class tutorials:**

- Art and science of ethical discourse (2 h)
- Ethical dilemmas related to R&D (2 h)
- Ethical dilemmas related to data processing and publication (2 h)
- Ethical dilemmas related to IT development and IP protection (2 h)

**Sources of individual readings:**

- R. De George: "Information technology, globalization and ethics", Ethics and Information

Technology, No. 8, 2006, pp. 29–40.

- R. Feynman: "Cargo Cult Science", 1974, http://www.physics.brocku.ca/etc/cargo_cult_science.php.
- J. Fielder, "Publication, ethics, and scientific integrity", IEEE Engineering in Medicine and Biology, July/August 1996, pp. 104–105.
- B. Martin: "Against Intellectual Property", Philosophy and Social Action, Vol. 21, No. 3, July-September 1995, pp. 7–22.
- R. Z. Morawski: "Ethical Aspects of Measurement–related Research and Engineering Practice", Proc. 10th IMEKO-TC7 Int. Symposium (St-Petersburg, Russia, June 30-July 2, 2004), pp. 10–20.
- On Being A Scientist – Responsible Conduct in Research, Committee on Science, Engineering, and Public Policy, Washington, D.C. 1995 (http://www.reflexives-lpr.org/webadmin/documents/On_being_a_scientist.pdf also http://books.nap.edu/catalog.php?record_id=4917#toc).
- G. Schatz (2004): "Letter to a Young Scientist", FEBS Letters, No. 558, 2004, pp. 1–2.
- A. E. Sweeney (2006): "Social and Ethical Dimensions of Nanoscale Science and Engineering Research", Science and Engineering Ethics, No. 12, 2006, pp. 435–464.
- J. Ziman (1998): "Why Must Scientists Become More Ethically Sensitive", Science, Vol. 282, No. 5395, December 4, 1998, pp. 1813–1814.

**Prerequisites** None

**Course exam** Written exam at the termination of the course

| | |
|---|---|
| **Course code** | WUT8 |
| **Course title** | Query Optimization in Databases |
| **Institution** | Warsaw University of Technology |
| **Course address** | WUT, Nowowiejska 15/19, 00 665 Warsaw, Poland |
| **City** | Warsaw, Poland |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | database systems, query optimization |
| **Language** | English |
| **Professor responsible** | Jarek Gryz |
| **Telephone** | + 1 416 736 2100 ext. 70150 |
| **Fax** | + 1 416 736 5872 |
| **Email** | jarek@cse.yorku.ca |
| **Participating professors** | Jarek Gryz |
| **Number of places** | Minimum: 10, Maximum: 30, Reserved for local students: 0 |
| **Objectives** | In this course, we go "under the hood" to learn how a relational database management system is built. In particular we will look into the main element of the database system, the query optimizer. Students will learn the issues involved in designing efficient database systems, and the strategies, data-structures, and algorithms used in the implementation of such systems. Additionally, we shall also explore some advanced topics in databases. |
| **Programme to be followed** | The course is designed in three parts: *the physical database, query processing, and advanced topics*. Specific contents include the following.<br>I. The Physical Database<br><br>file organizations<br>indexes<br>tree-structured indexing<br>hash-based indexes<br>external sorting<br>II. Query Processing<br><br>evaluation of relational operators<br>selection |

projection

joins (the many ways)

set operations

aggregate operations

relational query optimization

query evaluation plans

translating SQL queries into algebra

considering alternative plans

cost models and estimations

physical database design and tuning

III. Advanced Topics

deductive and active databases

object-relational and object-oriented databases

decision support systems

cutting-edge (research) topics (time permitting)

semantic query optimization

mediation and heterogeneous databases

cooperative query answering

databases and the web

**Required reading**

- Database Management Systems. Third Edition, 2003. Raghu Ramakrishnan and Johannes Gehrke. WCB/McGraw Hill. ISBN: 0-07-232206-3

**Recommended reading**

- M. Jarke, J. Koch, Query Optimization in Database Systems, ACM Computing Surveys, 16(2), 111-152, 1984. - S. Chaudhuri, An Overview of Query Optimization in Relational Systems, PODS 1998, 34-43.

**Prerequisites** An intorductory course in database systems.

**Course exam** Written exam at the end of the course.

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|---|---|
| **Course code** | ENSAM1 |
| **Course title** | Polymers and Composites |
| **Institution** | Ecole Nationale Supérieure d'Arts et Métiers |
| **Course address** | 151 bd de l'Hôpital 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 1st year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Polymers, Composites, Properties, Processing, Aging. |
| **Language** | English |
| **Professor responsible** | Abbas TCHARKHTCHI |
| **Telephone** | 01 44 24 63 01 |
| **Fax** | 01 44 24 63 82 |
| **Email** | abbas.tcharkhtchi@paris.ensam.fr |
| **Participating professors** | |
| **Number of places** | Minimum: 0, Maximum: 20, Reserved for local students: 10 |
| **Objectives** | Polymers are presented in all sorts of shapes and sizes and application. They may be employed for transporting sour water in the form of sewage or for transporting pure water for drinking purposes. They may be used in manufacturing of cars plastic packaging systems, equipments in the house, containers, medical devices and so on. As composite materials, the polymers are an essential component in structural applications in the form of the A380 Super Jumbo Jet or the Boeing 787 Dreamliner. There are many examples which can show the importance of polymer in different science and technology and polymer engineering embraces a whole range of interest for the engineer and scientist. This course will cover the large variety of polymer materials, their fundamental properties related to their applications. |
| **Programme to be followed** | "During this course different aspects will be developed : - basic knowledge of polymers and composites (structure of molecular chains, different physical states, morphology...)<br>- properties of polymers and composites<br>- polymers and composites in industry (bio-polymers, bio-degradable polymers...)<br>- polymer aging (physical and chemical aging)<br>- polymers and composites during processing (injection molding, extrusion, rotational molding...)<br>- analytical methods (differential scanning calorimetric, infra-red spectrometry, thermo-mechanical analysis, rheometry, mechanical tests). |

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|---|---|
| **Prerequisites** | The course is, indeed, an initiation of polymer and composite engineering and science for students knowing a little about materials and the mechanics of materials. |
| **Course exam** | The students will present a short report on selected topics of the course at the end of programme. |

| | |
|---|---|
| **Course code** | ENSAM5 |
| **Course title** | Building Acoustics - Acoustique du BTP |
| **Institution** | Ecole Nationale Supérieure d'Arts et Métiers |
| **Course address** | 151, Boulevard de l'Hôpital |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | Good |
| **Key words** | Building acoustics, room acoustics, sound-noise, acoustics measurements, signal treatments. |
| **Language** | French |
| **Professor responsible** | Bénédicte Hayne Lecocq |
| **Telephone** | +33 1 44 24 61 96 |
| **Fax** | +33 1 44 24 62 29 |
| **Email** | benedicte.hayne@paris.ensam.fr |
| **Participating professors** | M. Aufrey (ESTP), M. Desmadryl (CHEC) |
| **Number of places** | Minimum: 5, Maximum: 33, Reserved for local students: 15 |
| **Objectives** | Students of this ATHENS course will become familiar with the fundamentals of acoustics and with its use in buildings and in an urban environment. |
| **Programme to be followed** | Physical acoustics phenomena : sound propagation, noise sources schemes, acoustic radiation,<br>Noise perception : human hearing system, perception of sound,<br>Room acoustics : construction and conception acoustics aspects,<br>Noisy equipments and installations, active control,<br>Techniques and instruments measurements, Signal treatments,<br>Standards and laws concerning traffic noise and building acoustics,<br>Application examples. |
| **Prerequisites** | None. |
| **Course exam** | Written examination at the end. |

| | |
|---|---|
| **Course code** | ENSAM6 |
| **Course title** | Introduction to Musculoskeletal and Osteoarticular Biomechanics |
| **Institution** | Ecole Nationale Supérieure d'Arts et Métiers |
| **Course address** | 151 bd de l'Hôpital |
| **City** | 75013 PARIS |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | Fair |
| **Key words** | Biomechanics - Pluridisciplinarity - Experiments - Modelling - Musculoskeletal - Implants. |
| **Language** | English |
| **Professor responsible** | Nathalie MAUREL and Amadou DIOP |
| **Telephone** | 01 44 24 63 18 |
| **Fax** | 01 44 24 61 21 |
| **Email** | amadou.diop@paris.ensam.fr et nathalie.maurel@paris.ensam.fr |
| **Participating professors** | |
| **Number of places** | Minimum: , Maximum: 30, Reserved for local students: |
| **Objectives** | This course will be an introduction to the application of the mechanical principles to the study of the biomechanical behaviour of musculoskeletal and articular systems of human body. It will present clinical and mechanical aspects and will include both experimental and numerical approaches. The final aim of the musculoskeletal and articular biomechanics is to better understand the mechanical behaviour of intact, injured, pathologic of restored human body segments, to help in the design of implants and prostheses, and to help the clinicians in therapeutics strategies. |
| **Programme to be followed** | Introduction to the Musculoskeletal and Articular Biomechanics<br>Functional Anatomy: Spine - Shoulder - Hip - Knee<br>Clinical Problems and Osteoarticular Implants<br>Biomechanical Behaviour of Tissues<br>Articular Kinematics - Theory<br>Articular Kinematics - In Vivo Experimental Analyses - Applications<br>Articular Dynamics - Segmental Models - Application<br>In Vitro Experimental Analyses of the Biomechanical Behaviour of Corporal Segments and of Implants<br>Normalisation of Implants Evaluation<br>Biomechanical Finite Element Models: Generalities<br>Biomechanical Finite Element Models: Applications |

The Bone Remodelling Process: Presentation - Simulation - Applications.

Visit of the biomechanical experimental and numerical facilities with practical demonstrations.

**Prerequisites** Basic knowledge in mechanics.

**Course exam** Final written test (1 h 30).

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|---|---|
| **Course code** | ENSAM8 |
| **Course title** | From Creativity to Innovation |
| **Institution** | Ecole Nationale Supérieure d'Arts et Métiers |
| **Course address** | Ecole Nationale Supérieure d'Arts et Métiers |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Creativity, innovation, management, competencies. |
| **Language** | English |
| **Professor responsible** | Isabel FOUCHECOUR |
| **Telephone** | 01 45 41 28 67 |
| **Fax** | 01 44 24 62 70 |
| **Email** | isabel.fouchecour@gmail.com |
| **Participating professors** | Pierre Clause, Marc de Fouchécour |
| **Number of places** | Minimum: 8, Maximum: 16, Reserved for local students: 0 |
| **Objectives** | Innovation is a process that is nurtured and not the outcome of a decision. Innovation has more to do with the special relationship with one's environment than to the use of a management toolbox. Therefore, in order to boost the creativity of his/her teams, a manager must reflect first on his/her own personal creative process.<br>The goal of this course is to discover the path that leads from fundamental creativity (individual) to applied creativity (producing ideas in teams) that ultimately fuels a genuine innovation culture. |
| **Programme to be followed** | The seminar will tackle the following topics :<br>- how to promote creativity : individually, in a team.<br>- how the brain works : impact on the creative process,<br>- fundamental creativity : attitude and development,<br>- applied creativity : basics on ideas production techniques (e.g. diverging/converging, CPS process(R)),<br>- mind mapping as a booster,<br>- fertile questioning as an enabler,<br>- innovation culture - how to seed innova(c)tors.<br>Educational methods :<br>- numerous exercises and experiments (individually and as a whole team or in sub-teams),<br>- relation with the background (e.g. cognitive sciences), |

- extensive reference to non-verbal communication and use of one's fives senses.

**Prerequisites** None.

**Course exam** The evaluation mark will take into account two criteria :

- level of personal involvement in exercises and experiments,
- a written exam (a mind-map of the learnings of the week).

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|---|---|
| **Course code** | ESPCI1 |
| **Course title** | Non Destructive Evaluation and Characterisation of Materials |
| **Institution** | Ecole Supérieure de Physique et de Chimie Industrielles de Paris |
| **Course address** | 10 rue Vauquelin |
| **City** | Paris 75005 |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | None |
| **Key words** | Non destructive evaluation, X-ray radiography, ultrasonic inspection, thermography - optical methods |
| **Language** | English/French |
| **Professor responsible** | Gilles TESSIER |
| **Telephone** | +33 1 40 79 46 24 |
| **Fax** | +33 1 40 79 47 44 |
| **Email** | gilles.tessier@espci.fr |
| **Participating professors** | Gilles TESSIER, Stéphane HOLE, Jean-Claude CHARMET, Claire PRADA, JB d'ESPINOSE, Dominique BONNIN, Gérard DREYFUS |
| **Number of places** | Minimum: 5, Maximum: 15, Reserved for local students: 0 |
| **Objectives** | This five day course includes 15 hours of lectures and 16 hours of experimental laboratory work and/or visits of different laboratories of ESPCI and companies which are involved in non destructive evaluation.<br>Non-destructive evaluation has been developed both to achieve zero defect conditions in the fabrication of products as well as for surveillance during operation. The methods which are used are extremely varied, and call upon many different disciplines in physics and material science. Their sophistication has become more and more extended in order to meet ever rising demands of industry and research. This course is an introduction to the techniques used for non-destructive evaluation, and is focused on the most used. |
| **Programme to be followed** | -Industrial and medical use of X-Rays.<br>-Ultrasonics : transducers - principle of time reversal method - generation and optical detection and examples of applications.<br>-Infrared radiometry, passive and active.<br>-Charge control in dielectric materials.<br>-CND |
| **Prerequisites** | For Physicists and Material Science students ; elementary notions of Electromagnetism, Acoustics, Quantum Mechanics and Optics are necessary : wave propagation and Maxwell's equations, photoelectric effect, NMR. |

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| **Course exam** | Evaluation will be made on the basis of a twenty minute oral presentation of one of the techniques studied during the laboratory portion of the course. |

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| **Course code** | ESPCI2 |
| **Course title** | Structure-Property Relationships in Polymers |
| **Institution** | Ecole Supérieure de Physique et de Chimie Industrielles de Paris |
| **Course address** | ESPCI, 10 rue Vauqeulin 75005 PARIS |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | None |
| **Key words** | Polymers, chemistry, chemical physics, mechanics, rheology |
| **Language** | English/French |
| **Professor responsible** | Professor Jean Louis Halary |
| **Telephone** | 33 (0)1 40 79 47 86 |
| **Fax** | 33 (0)1 40 79 46 86 |
| **Email** | Jean-louis.halary@espci.fr |
| **Participating professors** | University Professors and Senior Researchers from CNRS and Companies |
| **Number of places** | Minimum: 8, Maximum: 25, Reserved for local students: 0 |
| **Objectives** | A huge variety of polymeric materials are widely used to satisfy both usual needs of every day's life and sophisticated applications in aerospace industries, medicine, microelectronics, optics, etc. This course would aim: i) to rank the materials in different families according to their chemical structure and architecture, ii) to provide an understanding of their macroscopic properties thanks to suitable structure- property relationships, and iii) to suggest some predictions for the design of new materials. |
| **Programme to be followed** | "a)two introductory 3-hour lectures (background on polymer morphology and chain mobility characteristics) in the case of amorphous and semi-crystalline thermoplastics ;<br>b)five specialized 3-hour lectures on:<br>- thermosetting polymers,<br>- vulcanized rubbers and thermoplastic elastomers,<br>- organic / inorganic hybrids and nanocomposites,<br>- adhesives,<br>- "smart" polymers and gels;<br>c)a round-table conference on the polymer R & D activities in a Multinational Company ;<br>d)the visit of an industrial site in Paris suburbs ;<br>e)a concluding exam session, based on short presentations given by the students on selected case studies." |
| **Prerequisites** | No extensive background in macromolecular science is required. General ideas in the fields of polymer |

chemistry, chemical physics, mechanics and rheology are welcome, together with great inquisitiveness of mind.

**Course exam** exam session, based on short presentations given by the students on selected case studies.

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|---|---|
| **Course code** | MP01 |
| **Course title** | Le langage C++ |
| **Institution** | Mines ParisTech |
| **Course address** | Ecole des Mines de Paris – 60 boulevard Saint Michel 75272 Paris cedex 6 |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | None |
| **Minimum level of French** | Good |
| **Key words** | Langage orienté objet, typage, héritage, généricité, contrôle d'accès, mécanisme d'exception, gestion de la mémoire, bibliothèque de programmes - STL, introspection |
| **Language** | French |
| **Professor responsible** | Valérie Roy, Centre de Mathématiques Appliquées, ENSMP |
| **Telephone** | +33 4 97 15 70 70 |
| **Fax** | +33 4 97 15 70 66 |
| **Email** | valerie.roy@ensmp.fr |
| **Participating professors** | Valérie Roy, CMA, cours et travaux pratiques<br>Ce cours a maintenant lieu à **Paris**. |
| **Number of places** | Minimum: 6, Maximum: 20, Reserved for local students: |
| **Objectives** | C++ est devenu le langage industriel normalisé incontournable. En effet, il combine les grandes qualités des langages de haut niveau orientés objets à la puissance des langages proches de la machine. Comme toutes les applications comportent des contraintes de temps d'exécution et d'espace mémoire, il permet l'implémentation des logiciels qui nécessitent une manipulation directe des cibles matérielles (systèmes d'exploitation, drivers de périphériques, réseaux,_) tout en apportant l'expressivité, la réutilisation, la maintenance, la simplicité d'évolution, la facilité de test, la gestion de gros projets, le passage à l'échelle, la stabilité des codes écrits et la portabilité.<br>C++ est un langage généraliste à large spectre. Ayant été intensivement utilisé dans de nombreux domaines, il devient désormais possible de l'utiliser efficacement dans les applications qui imbriquent une grande variété de disciplines : réseau, calcul numérique, applications graphiques, interfaces utilisateur, etc. C++ est un des langages de référence des logiciels libres Open Source.<br>C++ est un des principaux langages utilisés dans le monde industriel et dont la connaissance est indispensable à tout futur ingénieur désireux de s'impliquer dans les nombreux domaines connexes aux technologies de l'information et de la communication. |
| **Programme to be followed** | Dans le cours nous aborderons exhaustivement toutes les constructions du langage. Lors de travaux pratiques, l'accent est mis sur l'apprentissage du langage lui même, en dehors d'environnement de programmation intégré, afin que les mécanismes de compilation, d'édition de liens, de déboguage et |

d'exécution soient bien compris

Nous introduirons, au besoin, quelques notions d'algorithmique et de complexité nécessaires pour une bonne compréhension des difficultés inhérentes à la programmation.

Contenu

- la réutilisabilité et la généricité (pour réduire les coûts de développement : mécanismes orientés objets, classes template) ;
- le contrôle d'accès (séparation de la spécification et de l'implémentation) ;
- le typage fort et le polymorphisme (pour détecter les erreurs le plus tôt possible dans le cycle de développement : structures et classes, dérivation simple et multiple, surcharge des fonctions et des opérateurs, etc.) ;
- les mécanismes d'exceptions pour la gestion des erreurs à l'exécution ;
- la gestion de la mémoire (mémoire statique, pile d'exécution, mémoire dynamique, surcharge des opérateurs d'allocation et de désallocation) ;
- l'introspection sur les types de données lors de l'exécution ;
- l'utilisation de la STL, bibliothèque normalisée de classes et de fonctions C++,
- l'utilisation de la norme du langage C++.

Support de cours

La photocopie des transparents. Les livres cités dans la bibliographie seront consultables et empruntables pendant la durée du cours.

**Prerequisites** Quelques notions légères de programmation et d'informatique. Nous (re)verrons à la demande des élèves les différentes notions qui pourraient leur faire défaut.

**Course exam** Projet de programmation avec choix entre différents sujets suivant les thèmes du cours que les élèves souhaiteront approfondir.

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| **Course code** | MP02 |
| **Course title** | Couleur, arts, industrie |
| **Institution** | Mines ParisTech |
| **Course address** | Ecole des Mines de Paris - 60 boulevard Saint-Michel - 75272 Paris cedex 06 |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | None |
| **Minimum level of French** | Good |
| **Key words** | Couleur, effets visuels, perception, matériaux colorés, colorants, minéraux, applications artistiques et industrielles, traitement d'image |
| **Language** | French |
| **Professor responsible** | Béatrice AVAKIAN, Direction des Etudes, ENSMP |
| **Telephone** | +33 1 40 51 92 41 |
| **Fax** | +33 1 40 51 90 98 |
| **Email** | beatrice.avakian@ensmp.fr |
| **Participating professors** | Daniel FARGUE, Direction des études, Mines ParisTech,<br>François DELAMARE et Bernard MONASSE, Centre de mise en forme des matériaux, Mines ParisTech,<br>Amédée DJEMAI, Musée de minéralogie, Mines ParisTech,<br>Sophie NORVEZ et Corinne SOULIE, ESPCI,<br>Yves CHARNAY, Vonnik HERTIG et Patrick RENAUD, ENSAD,<br>Franck MAINDON, Ecole Louis Lumière,<br>Jean SERRA, ESIEE,<br>Lionel SIMONOT, Ecole Supérieure d'Ingénieurs de Poitiers |
| **Number of places** | Minimum: 10, Maximum: 40, Reserved for local students: |
| **Objectives** | Proposer une approche globale de la couleur au travers des sciences physiques et humaines et de ses applications dans les arts et l'industrie |
| **Programme to be followed** | Lundi :<br>Matin : Yves Charnay<br>Approche artistique de la lumière et de la couleur<br>Daniel Fargue<br>Approche physique de la lumière et de la couleur<br>Après-midi : Yves Charnay et Vonnik Hertig<br>TP sur la fabrication de maquettes d'objets colorés<br>Mardi : |

Matin : Amédée Djémai, L'origine de la couleur dans les minéraux

Sophie Norvez, Corinne Soulié, De la photo numérique au cyanotype de 1842

TP par demi-groupes (avec l'Espci)

Après-midi : Lionel Simonot, TP de colorimétrie

Mercredi :

Matin : Yves Charnay et Bernard Monasse

Sciences de l'ingénieur et choix des couleurs

Après-midi : visites d'entreprises de l'automobile

Jeudi :

Matin : Amédée Djémai, L'origine de la couleur dans les minéraux

Sophie Norvez, Corinne Soulié, De la photo numérique au cyanotype de 1842

TP par demi-groupes (avec l'Espci)

Après-midi : François Delamare

Pigments et colorants

Vendredi :

Matin : Jean Serra, Traitement de l'image numérique couleur

Franck Maindon, La restitution des couleurs dans l'image numérique

Après-midi :

Contrôle des connaissances

**Prerequisites** Notions de base sur la lumière et les rayonnements

**Course exam** Questionnaire (QCM et questions de réflexion)

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|---|---|
| **Course code** | MP03 |
| **Course title** | Europe utile : une approche industrielle |
| **Institution** | Mines ParisTech |
| **Course address** | Bruxelles, le lundi 16 mars (frais de transport s'élèvant à environ 75 euros) et Ecole des Mines de Paris - 60, boulevard Saint-Michel - 75272 Paris Cedex 06, du mardi au vendredi |
| **City** | Paris (plus 1 jour à Bruxelles) |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Poor |
| **Minimum level of French** | Good |
| **Key words** | Union Européenne, Europe, Marché Commun, Marché Unique |
| **Language** | French |
| **Professor responsible** | Gérard FOUILLOUX, Ancien délégué pour les affaires européennes, SNECMA, Bruxelles |
| **Telephone** | +33 1 40 51 90 81 |
| **Fax** | +33 1 40 51 90 98 |
| **Email** | pierre.baladi@ensmp.fr |
| **Participating professors** | Nombreux spécialistes des affaires européennes |
| **Number of places** | Minimum: 15, Maximum: 40, Reserved for local students: 15 |
| **Objectives** | Faire connaître aux élèves les processus de prise de décisions dans l'Union Européenne d'une façon générale d'abord, puis, en orientant exposés et interventions vers les besoins des entreprises.<br>Présenter les activités de grands groupes français et étrangers face aux opportunités et enjeux offerts par le développement de l'Union Européenne. |
| **Programme to be followed** | Des modules successifs et cohérents :<br><br>- Immersion dans l'UE à Bruxelles, le lundi 16 mars :<br>Visites de la Commission, du Parlement Européen, de la Représentation Permanente de la France.<br><br>- Le labyrinthe communautaire : comprendre pour agir - aspects institutionnels.<br><br>- Les politiques génériques :<br>concurrence, recherche, innovation, marché unique, commerce, environnement, société de l'information.<br><br>- Le lobbying . |

- Synthèse et conclusion politique.

Ce module a bénéficié d'une subvention octroyée par la Commission Européenne dans le cadre de l'Action Jean Monnet "Module Européen"

**Prerequisites** Aucune connaissance spécialisée particulière

Attention, les frais de transport pour le déplacement à Bruxelles s'élèvent à environ 75 euros

**Course exam** Examen oral : le vendredi 20 mars 2007

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|---|---|
| **Course code** | MP04 |
| **Course title** | Gestion et évaluation des risques |
| **Institution** | Mines ParisTech |
| **Course address** | Ecole des Mines de Paris - 60, boulevard St Michel - 75272 Paris Cedex 06 et une journée de visites sur le terrain (en Ile-de-France ou région limitrophe) ; les frais de transport s'élèvent à environ 40 euros |
| **City** | Paris (plus 1 jour dans les environs de Paris, coûts : environ 40 euros) |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | None |
| **Minimum level of French** | Good |
| **Key words** | Risque technologique majeur, Santé et sécurité au travail, Responsabilités, Erreur humaine, Défaillance organisationnelle, Gestion de crise, Prévention des risques |
| **Language** | French |
| **Professor responsible** | Pablo LIBREROS, Responsable de la formation des corps techniques de l'État, ENSMP / Franck GUARNIERI, Directeur du CRC, ENSMP |
| **Telephone** | +33 1 40 51 90 22 |
| **Fax** | +33 1 40 51 92 87 |
| **Email** | pablo.libreros@ensmp.fr |
| **Participating professors** | Franck GUARNIERI, Erik HOLLNAGEL, Emmanuel GARBOLINO, Christophe MARTIN (Ecole des Mines de Paris) et Patrick LAGADEC (Laboratoire d'Econométrie, École Polytechnique)… |
| **Number of places** | Minimum: 16, Maximum: 40, Reserved for local students: 16 |
| **Objectives** | Bhopal, Seveso, Mexico, Tchernobyl, Toulouse... Les sociétés modernes sont confrontées à des risques technologiques qu'elles ne maîtrisent qu'imparfaitement, et un accident industriel peut avoir des conséquences profondes et durables, tant sanitaires et environnementales qu'économiques et sociales. Les risques chroniques et les maladies professionnelles sont également perçus avec une sensibilité croissante, et les problèmes touchant simultanément à la protection de la santé des salariés et de l'environnement se révèlent particulièrement complexes.<br>Cette semaine poursuit un objectif de sensibilisation à quatre niveaux :<br>l'état des pratiques en matière de maîtrise des risques industriels et des risques professionnels<br>l'impact des régimes de responsabilités tant civil, pénal qu'éthique<br>la nécessaire prise en compte des dimensions humaine et organisationnelle à l'origine des accidents, maladies professionnelles et catastrophes<br>la planification opérationnelle en vue des situations d'urgence et de crise : identification des responsabilités, des moyens, répartition des tâches, préparation du « terrain humain », etc.,<br>L'enseignement se fonde sur des exemples concrets et des simulations pratiques. Il est notamment illustré par les risques technologiques majeurs et en santé et sécurité au travail que présentent les industries chimique et nucléaire. |

Il s'agit au bout du compte d'inviter les étudiant à développer un mode de pensée et de comportement adéquat, pour privilégier les démarches de prévention et pour réagir, au mieux, à la survenance d'une crise.

**Programme to be followed**

La semaine comporte typiquement :

- trois journées de présentation des principales notions (risque, danger, crise), des statistiques d'accidents et de maladies professionnelles, du dispositif réglementaire français et de son impact sur les régimes de responsabilité, d'un retour d'expérience de grands accidents industriels, des concepts d'erreur humaine et de défaillance organisationnelle, des systèmes de management des risques et de la mesure de leur performance ; au cours desquelles interviennent des fonctionnaires, des industriels, des experts, des « parties prenantes » : élus, représentants d'associations, etc.
- une journée consacrée à la visite de sites industriels à risque (« Seveso seuil haut ») ;
- une journée de formation à la gestion de crise et à la communication.

**Prerequisites**

Aucune connaissance spécialisée particulière

**Course exam**

Conditions du contrôle des connaissances

Examen écrit. : le 20 mars 2009

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|---|---|
| **Course code** | MP05 |
| **Course title** | Health and Medicine : Social, Political, and Ethical Issues at National and European Levels |
| **Institution** | Mines ParisTech |
| **Course address** | Ecole des mines de Paris, 60 boulevard Saint-Michel, 75272 Paris, Cedex 06 |
| **City** | Paris |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | Poor |
| **Key words** | Biomedicine, Patient Organizations, Health Safety Agencies, Ethics, Europe, Social and Political Analysis |
| **Language** | English |
| **Professor responsible** | Vololona RABEHARISOA, Centre de sociologie de l'innovation, ENSMP |
| **Telephone** | +33 1.40.51.92.85 |
| **Fax** | +33 1.43.54.56.28 |
| **Email** | vololona.rabeharisoa@ensmp.fr |
| **Participating professors** | Provisional list:<br>Olivier BORRAZ, Centre de sociologie des organisations, Institut d'Etudes Politiques, Paris.<br>Simone BATEMAN Centre de recherche Sens, Ethique et Société, CNRS and Université René Descartes, Paris |
| **Number of places** | Minimum: 10, Maximum: 40, Reserved for local students: 10 |
| **Objectives** | The domain of health and medicine is currently confronting a series of transformations: the increasing entanglement between biological sciences and medical practice; the emergence of new actors (patient organizations, health safety agencies) who actively intervene into biomedical activities and health issues; the development of ethical concerns on medical experimentation and research protocols.<br>The course aims at providing an understanding of these transformations, with a particular focus on their social and political relevance both at national and European levels. |
| **Programme to be followed** | Programme subject to changes (order, contents).<br>Monday:<br>Morning<br>"Microbes and Men" : What is Biomedicine? (Vololona Rabeharisoa)<br>Afternoon<br>Practicing Biomedicine (Véronique Stoven)<br><br>Tuesday:<br>Morning |

Patients' Participation in Biomedical Activities (Vololona Rabeharisoa)

Afternoon

Visit to Généthon and I-Stem laboratory (to be confirmed) (Vololona Rabeharisoa)

Wednesday:

Morning

Mapping and Analyzing Patient Organizations (Vololona Rabeharisoa)

- Afternoon

Ethics of Biomedical Practices: Examples from The Netherlands (Dick Willem, University of Amsterdam, The Netherlands)

Thursday:

- Morning

European Research Policy in Biomedicine (Joao Arriscado Nunes, University of Coimbra, Portugal)

- Afternoon

Students are invited to prepare their dossiers for the final exam

Friday:

Exam (format to be announced)

**Prerequisites**

**Course exam** To be announced

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| **Course code** | MP06 |
| **Course title** | Nonlinear Computational Mechanics |
| **Institution** | Mines ParisTech |
| **Course address** | Mines ParisTech, 60 boulevars Saint Michel |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Plasticity, material models, large deformation, finite element, structure calculation |
| **Language** | English |
| **Professor responsible** | Jean-Louis CHABOCHE (ONERA) |
| **Telephone** | |
| **Fax** | |
| **Email** | georges.cailletaud@ensmp.fr |
| **Participating professors** | Jacques BESSON, Georges CAILLETAUD, Samuel FOREST (CDM, Mines ParisTech); Michel BELLET, Lionel FOURMENT (CEMEF, Mines ParisTech) |
| **Number of places** | Minimum: 6, Maximum: 24, Reserved for local students: |
| **Objectives** | The field of Nonlinear Computational Mechanics has grown very rapidly during the last decade. Due to the dramatic power increase of computers and workstations, research is very active. On the other hand, the development of robust and user friendly engineering softwares allows a wide range of applications in industry. The course presents an overview of the classical models and of the numerical methods used in the area, and shows how they can be applied in practical cases. Theory includes material and geometrical nonlinearities, and the numerical implementation in computer codes. Applications are taken from classical domains like aeronautical, spatial or car industry, but also from microelectronics, the field of energy for sustainable development, biomaterials, etc...<br><br>Computer labs are planned in the cursus. Students will be invited to choose their style: as developpers, they will have the opportunity to introduce new features in a selected finite element code; as user, they will have to perform finite element analyses on simple case studies involving material and/or geometrical nonlinearities.<br><br>After the course, attendants should have a good knowledge of some basic aspects in mechanics of material, including the material constitutive equations, the numerical algorithms and the finite element procedures. They will have the ability :<br>- to choose a material model and the proper procedure to identify the material parameters from |

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| | experiment;<br>- to perform calculations of the stress or temperature fields in nonlinear cases, and to successfully manage the iterative processes associated to nonlinearities;<br>- to deal with contact problems;<br>- to evaluate the quality of a FE result obtained with a nonlinear computation (mesh sensitivity, numerical integration). |
| **Programme to be followed** | Basic material models : material modeling, including rheology, plasticity criterion, incremental theory of plasticity, 3D plastic flow, basic hardening rules. Identification procedures, inverse problems.<br>Advanced constitutive equations : cyclic and complex loadings, damage models, models for thermomechanical loadings, foams and cellular systems, hyperelasticity, polymeric materials<br>Finite element formulation : elementary introduction of the method for thermal and mechanical applications. Newton technique, element assembly, tangent matrix. Integration of the constitutive equations, implicit algorithms.<br>Geometrical nonlinear and contact analysis, stabilization methods. Stability problems. Localization process. Mesh adaptation.<br>Coupled problems (thermal-metallurgical-mechanical interactions). |
| **Prerequisites** | It is mandatory to have a basic knowledge of linear algebra and calculus, and a basic knowledge in continuum mechanics (stress, strain, linear elasticity)<br>Course is easier for students who have already attended a basic Finite Element course, and who have already manipulated a FE code (not required).<br>Being curious about mechanical problems, having a good knowledge of plasticity theory would be a must, but is not really needed.<br>The course will have a website, that will be updated one week before the course. This will be an evolution (in english) of the following old site:<br>http://mms2.ensmp.fr/msi_paris/accueil_msi_paris.php<br>Students are also invited to navigate on:<br>http://mms2.ensmp.fr/ef_paris/accueil_ef_paris.php<br>This last link is a linear FE course (mostly in french). The part of the theory will be smaller in « nonlinear computational mechanics » than for this one. |
| **Course exam** | During the last afternoon devoted to computer labs, students are requested to show their numerical results in a 20-30 minute oral presentation (prepared by group of 2). |

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|---|---|
| **Course code** | MP07 |
| **Course title** | Écologie et environnement |
| **Institution** | Mines ParisTech |
| **Course address** | École Nationale Supérieure des Mines de Paris - 60, boulevard Saint-Michel, 75272 Paris Cedex 06, du 10 au 14 mars 2008 et stage de terrain en Normandie (estuaire de la Seine) du jeudi 13 au samedi matin 15 mars 2008 |
| **City** | Paris (plus 2 jours en Normandie) |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | None |
| **Minimum level of French** | Good |
| **Key words** | Ecologie, environnement |
| **Language** | French |
| **Professor responsible** | Michel POULIN (Centre de Géosciences, ENSMP) |
| **Telephone** | |
| **Fax** | |
| **Email** | Michel.Poulin@ensmp.fr |
| **Participating professors** | Michel POULIN (Centre de Géosciences, ENSMP) et Bernard SOULARD (Direction départementale de l'agriculture et de la forêt du Morbihan, Vannes) |
| **Number of places** | Minimum: 15, Maximum: 40, Reserved for local students: |
| **Objectives** | Cet enseignement a pour but de faire comprendre comment les activités sociales sont susceptibles de modifier la structure et le fonctionnement des écosystèmes. Il doit conduire l'élève à considérer l'ensemble des impératifs liés à la gestion du milieu naturel comme un facteur supplémentaire à prendre en compte dans toute décision de nature industrielle (ou autre) : il vient se conjuguer aux objectifs économiques, aux contraintes sociales et juridiques, etc..., et contribuer à donner à ces problèmes un éclairage original. |
| **Programme to be followed** | L'objectif du programme est double :<br><br>- découvrir et comprendre les principaux processus physiques, chimiques et biologiques se déroulant dans les milieux naturels ;<br><br>- prendre conscience sur des cas concrets de l'impact des technologies sur l'environnement et identifier cet impact.<br><br>Pour ce faire, un enseignement magistral est consacré aux fondements de l'écologie générale, à une initiation au droit et à l'économie de l'environnement, et à divers sujets tels que l'environnement |

atmosphérique, la modélisation des écosystèmes aquatiques et/ou la gestion des déchets.

Un stage et des visites de terrain sont consacrés à l'observation et à l'étude des différents écosystèmes, des perturbations anthropiques qu'ils subissent et des installations correctrices mises en œuvre (stations de traitement et d'épuration, stockage de déchets, etc...).

**Prerequisites** Aucune connaissance particulière, mais une formation ou un intérêt pour les sciences de la nature peuvent être appréciables.

**Conditions spécifiques :**

Les frais de transport et de séjour s'élèvent à une **centaine d'euros** pour le stage de terrain en Normandie (estuaire de la Seine) du jeudi 19 au samedi matin 21 mars 2008.

**Course exam** Forme du contrôle : rapport de stage.

| | |
|---|---|
| **Course code** | MP09 |
| **Course title** | Financial Markets after the Crash |
| **Institution** | Mines ParisTech |
| **Course address** | 60 boulevard Saint Michel |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | Poor |
| **Key words** | Financial Markets, Derivatives, Bubble, Crisis |
| **Language** | English |
| **Professor responsible** | Alfred Galichon (Ecole Polytechnique) |
| **Telephone** | |
| **Fax** | |
| **Email** | alfred.galichon.googlepages.com |
| **Participating professors** | Alfred Galichon (Ecole Polytechnique) |
| **Number of places** | Minimum: 10, Maximum: 25, Reserved for local students: 10 |
| **Objectives** | Provide a working knowledge of the stakes of the financial markets today, including some perspectives on the current crisis. Investigate the relevancy of quantitative approaches to investment.<br><br>This course examines the strategic issues on financial markets, from the firms' point of view (impact on the structure of the firm, reporting, choice of mode of financing), and from the investors' point of view (investment decision, risk management, and strategic/tactic asset allocation).<br>A particular effort is put on efficiency issues, and trying to understand the mechanisms which led to the current financial crisis, and try to understand the stakes of the rebuilding of tomorrow's finance.<br>Each key notion of the course is illustrated by case studies, and active participation from the students is expected. Debate and constructive confrontation between points of views will be encouraged. Although a significant part of the time will be spent discussing quantitative tools and models, the course is not a quantitative one as such, but an invitation to think about the relevant range of use of quantitative tools. |
| **Programme to be followed** | ***1.Financing the Economy***<br>**Day 1: Models of financing of the Economy**<br>*Morning* : Which capitalism ?<br>Lecture : The models of capitalism.<br>Discussion : Capitalism vs. Capitalism, redux |

Documents : Book “Saving Capitalism from the Capitalists” by Rajan and Zingales. Paper “The legal determinants of External Finance” by A. Shleifer.

*Afternoon* : The structure of the firm

Lecture : Modigliani-Miller and its alternatives.

Discussion : Corporate Governance and corporate control

Case : Stock-options and Incentive theory

**Day 2 : Markets and Financing**

*Morning* : Firms and the Market

Lecture : Strategic issues for firms on financial markets : primary/secondary markets, debt/equity markets.

Discussion: The role of disintermediation in the financial crisis. Paper by R. Merton “Perspectives on Financial Intermediation”.

*Afternoon* : Financial reporting

Lecture : Financial reporting, accounting standards and their impact.

Case : Enron

***2. Savings and Investment***

**Day 3 : Investment tools**

*Morning* : Portfolio theory

Lecture : Quantitative investment models and their pitfalls. Notions de « Behavioural Finance ».

Case study : Quantitative finance and crisis. 1998 and 2008, a comparison.

*Afternoon* : Risk Management, and Crisis

Lecture : Risk Management methodology. Regulatiotory rules : Basel and Basel II. Measures of risk: VaR, Tail-VaR, factor models. Limit of the tools.

Case : The subprime crisis.

**Day 4 : Asset management**

*Morning* : Asset management and allocation

Lecture : Strategic vs Tactical asset allocation.

Case: HBS case “The Yale Endowment office”

*Afternoon* : l’industrie de la gestion

The afternoon will be devoted to studying to asset management industries:

- Private Equity and the KKR example
- Hedge funds (quantitative : Renaissance or activists : TCI)

***3. Conclusion***

**Day 5 : Conclusion session: Crisis, states and regulation**

*Morning* :

Lecture: the role of the state in financial crisis.

Discussion: Should the US government have saved Lehman?

*Afternoon* : Evaluation.

**Prerequisites** Good quantitative skills (corresponding to a BSc or BA in Economics or in any quantitative social sciences)

**Course exam** Oral presentation througout the whole week

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|---|---|
| **Course code** | TPT03 |
| **Course title** | Scientific Research Method : Techniques, Models and Practices |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | Telecom ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Research Methodology, Fundamentals of Scientific Investigations |
| **Language** | English |
| **Professor responsible** | Prof. Patrick BELLOT |
| **Telephone** | +33 (0)6 75 06 58 67 |
| **Fax** | +33 (0)1 45 81 71 58 |
| **Email** | bellot@telecom-paristech.fr |
| **Participating professors** | Prof. Patrick BELLOT, ENST, Paris, France.<br>Prof. Vu DUONG, Senior Scientific Advisor, Eurocontrol Experimental Centre, Brétigny-sur-Orge, France. tél. : +33 (0)1 69 88 76 31 fax : + 33 (0)1 69 88 69 51 email : vu.duong@eurocontrol.int |
| **Number of places** | Minimum: 10, Maximum: 50, Reserved for local students: 15 |
| **Objectives** | Scientific Method is fundamental in scientific and technological research. Lectures introduce to graduate students, with research orientation, to the models and practices of scientific investigations: how to define a research topic, perform literature review, identify research hypothesis; how to conduct the scientific investigation; and how to write scientific papers as well as graduate dissertations. |
| **Programme to be followed** | Through theoretical lectures and classroom exercises, the course aims at introducing to:<br>- the different characteristics of the typical procedures and models related to the selection and the execution of a scientific research topic,<br>- the models and techniques to help research students solving the practical problems often encountered in scientific investigations,<br>- the understanding of the practices of scientific research: why and how a research topic is defined; how to write a research proposal; how to formulate or to model a research problem; why and how to set up an experiment and to perform data analysis; how to write scientific papers; and ethical considerations in scientific research.<br><br>Contents: 10 lectures of 3h.<br>-Lecture 1 : Introduction to scientific research and overview of scientific method, |

-Lecture 2 : Developing fundamental aptitudes in scientific research,

-Lecture 3 : Formulating a research problem – Defining research hypothesis,

-Lecture 4 : Refining a research problem – Review of literature and bibliographic search,

-Lecture 5 : Conducting scientific investigation – Observational and Experimental methods,

-Lecture 6 : Modeling and Simulation – introduction to Computational Mathematics,

-Lecture 7 : Design of experiments – practical rules for controlled experiments,

-Lecture 8 : Statistical analysis – parametric tests and non-parametric tests,

-Lecture 9 : Guidelines for writing scientific publications and dissertations,

-Lecture 10 : Ethical considerations in scientific research.

**Prerequisites** General physics and mathematics.

**Course exam** Assignments:

1. Critical review of a research paper – to accomplish at Lecture 10.

2. Individual paper describing the state-of-the-art of a selected topic (literature survey and literature map) – to accomplish four weeks from the end of the lecture.

Grading Policy :

Reviewing paper: 25% + literature survey: 75%

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|---|---|
| **Course code** | TPT05 |
| **Course title** | Managing Communication in an International Context |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | Telecom ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Working across cultures, Interactive skills for meetings, Leadership, Role plays |
| **Language** | English |
| **Professor responsible** | Olivier FOURNOUT, Vera DICKMAN, Lorna MONAHAN |
| **Telephone** | + 33 (0) 1 45 81 80 24 |
| **Fax** | + 33 (0) 1 45 65 95 15 |
| **Email** | olivier.fournout@telecom-paristech.fr |
| **Participating professors** | The course will be taught by Olivier FOURNOUT, who coordinates the courses on leadership within the « Soft Skills » catalogue of courses at TELECOM ParisTech, Vera DICKMAN, head of the Modern Languages and Cultures Department, Lorna MONAHAN, coordinator of English in the Modern Languages and Cultures Department and James BENENSON, English teacher in the Modern Languages and Cultures Department. |
| **Number of places** | Minimum: 8, Maximum: 16, Reserved for local students: 4 |
| **Objectives** | The aim of the course is to become aware of one's own style of communication and to understand how different management cultures (corporate or national) influence decision-making. Communication in an international context requires determining a common language and common processes which allow one to reach objectives quickly and efficiently whatever the cultural context.Emphasis will be laid on the role of chairing a meeting in a multicultural environment where communication patterns differ, as do expectations with regard to outcome. The chair of the meeting assumes a kind of "leadership" delegated by the groups so as to produce a certain result within the time of the meeting. The objective of the course is to provide theoretical background on intercultural communication as well as general methodology and skills for preparing, running and participating in different types of meetings.The pedagogical approach combines short methodological points, role plays and case studies. |
| **Programme to be followed** | The work of Hofstede, Trompenaars and Hall will be referred to in order to define dimensions of culture that have an impact on how we communicate in general. Three interactive skills, initiating, clarifying and reacting will be presented and practiced through meetings in which the necessity for agreeing upon clearly articulated processes and their outcomes will be demonstrated. The framing function delegated to the chair of the meeting will be worked on. These concepts will then be applied |

to the communication process through videos, role plays and case studies. Observation, analysis and discussion will lead to a greater understanding of how communication can be managed in an international context.

**Prerequisites** Participants must have an advanced level of English (level 4 or C1 in the ALTE or Common European Framework of reference).

**Course exam** Daily attendance from 9.30am – 12.30pm and from 2 - 5pm is obligatory. Feedback on English language use will focus on effective communication rather than on linguistic errors. Active participation is the main requirement that will be taken into account for the final grade.

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|---|---|
| **Course code** | TPT06 |
| **Course title** | Recherche opérationnelle et aide à la décision |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | None |
| **Minimum level of French** | Fair |
| **Key words** | recherche opérationnelle, aide à la décision, optimisation combinatoire, modélisation mathématique, décision multicritère, agrégation de préférences |
| **Language** | French |
| **Professor responsible** | Prof. Olivier HUDRY |
| **Telephone** | + 33 (0) 1 45 81 77 63 |
| **Fax** | + 33 (0) 1 45 81 31 19 |
| **Email** | olivier.hudry@telecom-paristech.fr |
| **Participating professors** | Denis Bouyssou (Centre National de la Recherche Scientifique, Université Paris-Dauphine, LAMSADE)<br>Irène Charon (TELECOM ParisTech, département Informatique et Réseaux)<br>Olivier Hudry (TELECOM ParisTech, département Informatique et Réseaux) |
| **Number of places** | Minimum: 10, Maximum: 20, Reserved for local students: 8 |
| **Objectives** | Ce cours propose une introduction à la recherche opérationnelle et à l'aide à la décision. Il s'appuie sur deux problèmes liés à l'agrégation de relations binaires. Le premier, issu de la théorie du vote, consiste à savoir comment traduire un ensemble de préférences individuelles en une préférence collective qui reflète le mieux possible ces préférences individuelles ; le second, relevant du domaine de la classification, consiste à savoir comment regrouper des entités en classes telles que deux entités d'une même classe paraissent semblables (par rapport à un ensemble de critères fixés) et, au contraire, pour que deux entités de deux classes différentes apparaissent comme dissemblables. Pendant cette semaine, on modélisera mathématiquement ces problèmes d'agrégation à l'aide de graphes ou sous la forme d'un problème de programmation linéaire en 0/1. On étudiera ensuite sa complexité. Puis on décrira différentes méthodes d'optimisation combinatoire permettant de résoudre ces problèmes de manière exacte ou approchée. Certaines de ces méthodes seront programmées pendant des séances de travaux pratiques qui tiendront lieu de contrôle de connaissances. |
| **Programme to be followed** | Les différentes séances du cours seront consacrées aux thèmes suivants.- Introduction à la recherche opérationnelle et à l'aide à la décision- Méthodes d'aide à la décision multicritère- Illustrations de paradoxes en théorie du vote- Modélisations mathématiques de l'agrégation de préférences ou de |

relations d'équivalence à l'aide de graphes ou sous forme de problèmes de programmation linéaire en 0/1 - Méthodes exactes ou approchées d'optimisation combinatoire appliquées aux problèmes précédents : heuristiques et métaheuristiques, relaxation lagrangienne, méthodes arborescentes par séparation et évaluation- Des TP de programmation en C permettront d'illustrer certaines des méthodes précédentes aux problèmes décrits plus haut.

**Prerequisites** Connaissances de base en théorie des graphes et en optimisation combinatoire. Programmation en C pour les TP. Un goût pour la modélisation mathématique.

**Course exam** Le contrôle des connaissances se fera par les TP programmés pendant la semaine et par la présence aux cours.

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| **Course code** | TPT07 |
| **Course title** | Optical Communications |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | None |
| **Key words** | Lasers ; Optical Fibres ; Optical Modulators ; Integrated Optics ; WDM Networks |
| **Language** | English |
| **Professor responsible** | Cédric WARE |
| **Telephone** | + 33 (0) 1 45 81 74 85 |
| **Fax** | + 33 (0) 1 45 89 00 20 |
| **Email** | cedric.ware@telecom-paristech.fr |
| **Participating professors** | Didier ERASME (TELECOM ParisTech, Département Communications et Electronique), Renaud GABET (TELECOM ParisTech, Département Communications et Electronique), Philippe GALLION (TELECOM ParisTech, Département Communications et Electronique), Yves JAOUEN (TELECOM ParisTech, Département Communications et Electronique), Cédric WARE (TELECOM ParisTech, Département Communications et Electronique) |
| **Number of places** | Minimum: 10, Maximum: 30, Reserved for local students: 10 |
| **Objectives** | This course corresponds to a "hands-on" first approach of optical telecommunication systems. It aims at giving an overview of the main "ingredients" used in the design and the realisation of an optical telecommunication systems: sources, transmission channels, receivers, intermediate components, as well as familiarising students with the basic equipment used in the domain. |
| **Programme to be followed** | The program is mainly based on laboratory experience. It includes :-- 9 hours of lectures and conferences :Optical systems design and performance.External modulators and integrated optics devices (integrated optical waveguides, electro-optics and electro-absorption effects)Sources for optical communications : LED and laser-diodes. general operation and properties of devices (LED, Fabry-Perot and DFB cavities, homo- and heterojunction, quantum well lasers). Modulation and noise properties.Optical fibres (guiding, attenuation, dispersion properties). -- 21 hours of laboratory exercises :Characterization of optical fibres (attenuation and dispersion measurements).Characterization of laser-diodes.Electro-optics modulators and integrated optics.Characterization of photodetectors and observation of receiver noise.Demonstration of a heterodyne detection system.Characterization of an optical amplifier.Optical systems modelling. |
| **Prerequisites** | This course requires a basic familiarity with electromagnetic waves and optics, and with semiconductor |

or quantum physics.

**Course exam** The evaluation is based on regular examinations during the course laboratory sessions.

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|---|---|
| **Course code** | TPT08 |
| **Course title** | Ingénierie du risque |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | None |
| **Minimum level of French** | Good |
| **Key words** | Risque, évaluation |
| **Language** | French |
| **Professor responsible** | Tullio Joseph TANZI |
| **Telephone** | + 33 (0) 1 45 81 75 06 |
| **Fax** | + 33 (0) 1 45 81 37 94 |
| **Email** | tullio.tanzi@telecom-paristech.fr |
| **Participating professors** | Patrick PERROT, Chef d'escadron, Institut de Recherches Criminelles de la Gendarmerie Nationale.<br>Frédéric DELMER, Avocat au barreau de Paris.<br>Marine CAMPEDEL, Ingénieur de recherche, TELECOM ParisTech, Département TSI Signal-Images.<br>marine.campedel@telecom-paristech.fr<br>Tullio TANZI, Professeur, TELECOM ParisTech, Département TSI Signal-Images.<br>tullio.tanzi@telecom-paristech.fr |
| **Number of places** | Minimum: 10, Maximum: 24, Reserved for local students: 8 |
| **Objectives** | Sensibiliser et initier à la complexité de l'évaluation et de la gestion des risques et des dangers dans l'entreprise. Acquérir les connaissances et méthodes fondamentales complétées d'éléments de réflexion sur le rôle de l'ingénieur. Appréhender la globalité de la gestion des dangers.<br><br>La société comme les entreprises sont aujourd'hui confrontées à des situations diverses de nature catastrophique ou accidentelle. Il existe des méthodes pour détecter les signaux faibles qui les caractérisent afin de prévenir et gérer ce type d'événement. Il est pour cela nécessaire de définir le concept de crise, d'acquérir des connaissances de bases sur la prise en compte des risques avant de pouvoir mener une réflexion sur la question.<br><br>L'objectif de ce cours est de sensibiliser et d'initier les étudiants à la complexité de l'évaluation et de la gestion des risques et des dangers au sein de l'entreprise, au travers de trois composantes inter-reliées : |

• S'initier à l'observation et à l'analyse de situations de danger, par l'étude de questions d'actualité, de catastrophes passées, de "cas d'école", et ce selon des fondements théoriques et méthodologiques rigoureux.
• Acquérir les connaissances et méthodes fondamentales complétées d'éléments de réflexion sur le rôle de l'ingénieur : responsabilité, retour d'expérience, aide à la décision, expertise et négociation, initiation aux méthodes d'évaluation des risques.
• Appréhender la globalité de la gestion des dangers et sa complexité liée à la présence de différents niveaux d'organisation : politique et stratégie du risk management, management Hygiène - Sécurité - Environnement, réglementation…

Ce cours a pour origine des travaux et des recherches conduites au sein des Ecoles de l'Institut TELECOM. Il s'appuie très largement sur l'expérience de chercheurs et d'ingénieurs qui ont fait des risques et des dangers leur métier. Il se propose d'ouvrir l'accès à un domaine complexe en faisant la part des fondements, des méthodes.

**Programme to be followed**

Organisation du cours dans la semaine :
Lundi : Introduction à la gestion des risques - Autopsies de grandes catastrophes Mardi : Méthodes d'analyse - Fiabilité humaine Mercredi : Analyse des risques en milieu réel. Etude de cas Jeudi : Intelligence économique - Aspects juridiques de la responsabilité Vendredi : Les sciences forensiques - Gestion de connaissances et risque
Description des modules : M1 : Introduction à la gestion des risques L'objectif de ce module est de présenter la démarche qui a mené à la gestion des risques tels qu'elle est pratiquée de jours. L'apprentissage de la sécurité par l'accident est retracé à travers les âges. Divers accidents et catastrophes représentatifs sont utilisés dans un but d'illustration de cette évolution. M2 : Autopsies de grandes catastrophes A travers l'analyse d'accidents de grande ampleur qui ont marqué notre société dans ses dernières décennies, ce module pose les bases de l'analyse de post accidentelle. Ce processus d'analyse est très important car il permet de déterminer les causes réelles et donc par la compréhension du déroulement de l'événement, il permet d'établir les modifications à apporter à fin que cela ne se reproduise pas. M3 : Méthodes d'analyse Les diverses méthodes d'analyse de risque existantes sont présentées dans ce module. M4 : Fiabilité humaine Méthode d'analyse de risque, principalement issus de la sûreté de fonctionnement, n'ont pas été conçu pour prendre en compte l'opérateur humain. La fiabilité humaine pose les bases de son fonctionnement. La compréhension et le respect de ce fonctionnement, au même titre que celui d'une machine, est nécessaire à la bonne cohabitation de l'opérateur humain dans un milieu technologique. M5 : Analyse des risques en milieu réel. Etude de cas Durant cette journée, l'objectif est de réaliser une analyse des risques d'une organisation technologique, dans des conditions similaires à celles rencontrées en milieu réel. Après les diverses phases d'acquisition d'informations, de préparation des données, l'analyse technique des risques pour être faite. Cette phase se termine par la rédaction d'un dossier d'analyse comportant une phase de recommandations. M6 : Intelligence économique. Ce module présente les bases de l'intelligence économique. Il est assuré par un intervenant Qui appartient à l'Institut de Recherches Criminelles de la

Gendarmerie Nationale. M7 : Aspects juridiques de la responsabilité La responsabilité prend de plus en plus de place dans notre société moderne. Ce cours est assuré par un intervenant qui est avocat au barreau de Paris. M8 : Les sciences forensiques Ce module porte sur les sciences forensiques. Il est assuré par un intervenant qui appartient à l'Institut de Recherches Criminelles de la Gendarmerie Nationale. M9 : Gestion de connaissances et risque Le risque est un objet polysémique. Il nécessite une équipe pluri-disciplinaire et manipule des informations d'origines et de formats différents. La gestion de connaissance fournit des outils permettant de manipuler ces données et d'en tirer les synthèses nécessaires à la prise de décision.

**Prerequisites** Ce cours s'adresse à toute personne intéressée par la question de la sécurité industrielle et désireuse de s'initier à un domaine qui tient une place prépondérante tant dans le monde de l'industrie, de l'entreprise que dans la vie de tous les jours. Il ne nécessite a priori aucun pré-requis. Il est accompagné d'un support de cours et d'une bibliographie.

**Course exam** Le rapport rendu lors de l'étude de cas constitue le contrôle de ce module.

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|---|---|
| **Course code** | TPT09 |
| **Course title** | Collective Intelligence |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | None |
| **Key words** | Genetic algorithms, artificial life, emergence, auto-organization, complexity, complex systems, social dynamics |
| **Language** | English |
| **Professor responsible** | Jean-Louis DESSALLES |
| **Telephone** | + 33 (0) 1 45 81 75 29 |
| **Fax** | + 33 (0) 1 45 81 31 19 |
| **Email** | jean-louis.dessalles@telecom-paristech.fr |
| **Participating professors** | Jean-Louis DESSALLES (TELECOM ParisTech, Dept Informatique et Réseaux) |
| **Number of places** | Minimum: 5, Maximum: 30, Reserved for local students: 15 |
| **Objectives** | Collective intelligent systems show emergent behaviour that is not centrally controlled. Social insects, neurones, genes, economic actors may collectively perform intelligent tasks that go way beyond what individual agents can do. The objective of this course is to describe some of the laws that rule emergent behaviour and allow to predict it. The behaviour of collective systems often goes against intuition. Their dynamics can be described through non-linear models that predict sudden transitions. Collective intelligence is best apparent during those transitions. Its study consists in accounting for the emergence of collective patterns when individual, generally simple, behaviours are given as input. |
| **Programme to be followed** | The main techniques studied in this module are:Genetic algorithms, in which a virtual population evolves and collectively adapts to a particular problem or to a new environment.Artificial life methods, which build on the concepts of complex system and of emergence to produce collective algorithms. They are used to address problems in which adaptability and robustness are essential.Models of segregation emergence, which show for instance how social classes may emerge as a consequence of symmetry breaking.We show how these different techniques apply to concrete problems, such as message routing in communication networks, optimal antenna location or communication emergence.The notion of emergence is formally defined, as well as concepts like punctuated equilibria, scale invariance, implicit parallelism and autocatalytic phenomena.The pedagogy consists in alternating lectures and practical work on machines. Students can modify the software platform that is |

provided to them, study emergent phenomena by themselves and develop their own personal project.

**Prerequisites** - Mastery of an object oriented programming language (Java, C++, ...)- Students may spend two hours or so to get acquainted with the Python programming language before the Athens week. The Python interpreter and tutorials can be downloaded free from the web.

**Course exam** - Open question quiz- Design of a personal software project during practical work sessions.

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|---|---|
| **Course code** | TPT13 |
| **Course title** | Technologies de l'information et risques |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | None |
| **Minimum level of French** | Good |
| **Key words** | Risques, évaluation, technologies de l'information, TIC, images, télédétection, sécurité, piratage |
| **Language** | French |
| **Professor responsible** | Tullio Joseph TANZI |
| **Telephone** | + 33 (0) 1 45 81 75 06 |
| **Fax** | + 33 (0) 1 45 81 37 94 |
| **Email** | tanzi@telecom-paristech.fr |
| **Participating professors** | Patrick PERROT, Chef d'escadron, Institut de Recherches Criminelles de la Gendarmerie Nationale.<br>Jo WIART, Docteur en physique, directeur de l'unité de recherche de France Télécom sur l'interaction des ondes électromagnétiques et du corps humain.<br>Alain GIROS, Gwendoline BLANCHET, Ingénieurs, Centre national d'études spatiales (CNES).<br>Richard LEPAGE. Professeur. École de technologie supérieure, Montréal (Québec, Canada) richard.lepage@etsmtl.ca<br>Michel ROUX, Enseignant-chercheur, TELECOM ParisTech, Département TSI Signal-Images. michel.roux@telecom-paristech.fr<br>Soufiane RITAL, Ingénieur de recherche, TELECOM ParisTech, Département TSI Signal-Images. soufiane.rital@telecom-paristech.fr<br>Marine CAMPEDEL, Ingénieure de recherche, TELECOM ParisTech, Département TSI Signal-Images. marine.campedel@telecom-paristech.fr<br>Tullio TANZI, Professeur, TELECOM ParisTech, Département TSI Signal-Images. tullio.tanzi@telecom-paristech.fr |
| **Number of places** | Minimum: 10, Maximum: 30, Reserved for local students: 10 |
| **Objectives** | Les catastrophes naturelles récentes que nous avons connues en France et à l'étranger, ont une fois encore démontré, si besoin était, notre exposition aux risques naturels. Ces évènements mettent en péril des vies humaines, causent des dommages économiques importants, détruisent des monuments et modifient les équilibres écologiques. La Déclaration des Droits de l'Homme rappelle que la sûreté est |

un droit inaliénable de l'individu. Les actions directes sur les phénomènes, bien qu'efficaces, restent limitées. Il faut donc apprendre à réduire la vulnérabilité afin de limiter les conséquences de ces catastrophes. La gestion du risque doit être intégrée dans notre quotidien.

L'utilisation des techniques modernes issues des technologies de l'information telles que la télédétection ou encore le traitement des signaux et des images, mises en œuvre conjointement avec les techniques actuelles de communication, nous offrent de nouvelles possibilités dans la gestion des événements de type catastrophiques. Ces techniques vont nous permettre dans un premier temps d'accroitre nos connaissances sur les phénomènes, puis dans un second temps d'évoluer vers une gestion de ces risques.

L'objectif de ce cours est de sensibiliser et initier à la complexité de la gestion des risques liée à l'utilisation des TIC. Pour cela, il est nécessaire d'acquérir les connaissances et méthodes fondamentales complétées d'éléments de réflexion sur le rôle de l'ingénieur.

**Programme to be followed**

Organisation de la semaine :

Lundi : Apports de l'image satellitaire pour le risque - Charte internationale "Espace et catastrophes majeures" Mardi : Détection de changement - SGBD multimédia Mercredi - Atelier Image satellitaire et risque Jeudi : Ondes électromagnétiques et risque - Data mining pour le risque Vendredi : Les sciences forensiques - Gestion de connaissances et risque Description des modules :

M1 : Apports de l'image satellitaire pour le risque Ce module propose les pré-requis issus du domaine de la télédétection et de l'analyse d'images, qui sont nécessaires à la bonne compréhension de leur utilisation dans le domaine du risque. M2 : Charte internationale "Espace et catastrophes majeures" La Charte regroupe 10 agences spatiales et organisations mondiales et vise à offrir un système unifié d'acquisition et de livraison des données satellitaires dans les cas de catastrophes d'origine naturelle ou humaine. Ce module explore les divers mécanismes d'activation de la Charte et illustre quelques activations significatives et leurs répercussions. M3 : Détection de changement Lors d'une catastrophe, des changements importants dans l'occupation du sol et dans les diverses structures (routes, lignes de transport, bâtiments, …) apparaissent. Ce module explore divers algorithmes pour détecter et catégoriser ces changements à partir d'images satellitaires captées avant et durant/après la catastrophe. M4 : Système de Gestion et d'Analyse des Bases de Données Multimédia « SGABDM » Toute organisation professionnelle dispose d'un système d'information 'SI' d'une forme ou d'une autre. La révolution du monde numérique grâce aux progrès technologiques en compression et numérisation, complique plus les tâches des SI. Un système qui gère correctement un volume moyen d'activité peut s'effondrer sous l'effet d'une masse de plus en plus grande d'informations à savoir les multimédia : image, vidéo, audio, texte, etc. Dans le module SGABDM, nous abordons les fonctionnalités de stockage, de manipulation et d'analyse des images satellitaire dans un SI pour le risque. Un exemple d'application « la plate forme PLAform Tsi Online 'PLATO' » est présenté dans ce module. M5 : Atelier ORFEO ToolBox autour de l'image satellitaire et de risque. ORFEO, Optical and Radar Federated Earth Observation, est le système dual d'observation de la Terre par satellite constitué d'une composante optique développée par le CNES, Pléiades HR, et une composante radar

développée par l'ASI, Cosmo-Skymed. Dans le cadre du Volet méthodologique du Programme d'accompagnement ORFEO, le CNES a développé l' "ORFEO Toolbox" (OTB), un ensemble de briques algorithmiques qui permettront le développement des outils nécessaires à l'exploitation opérationnelle des futures images (aspects tridimensionnels, détection de changements, analyse de texture, reconnaissance de formes, complémentarité optique et radar, etc.). OTB s'appuie essentiellement sur des études de R&D et des travaux de recherche doctorale et post doctorale. Dans cet atelier, et dans un premier temps, nous explorons la partie utilisation d'applications bâties autour d'OTB, des applications adaptées à la télédétection et particulièrement aux images à très haute résolution spatiale. Dans un deuxième temps, nous définissons des chaînes d'expérimentations en utilisant des fonctionnalités « filtres» pré-intégrées dans l'outil OTB. M6 : Ondes électromagnétiques et risque. Les ondes et les champs électromagnétiques sont présents autour de nous depuis toujours tout simplement parce qu'il existe un environnement électromagnétique naturel. Notre organisme émet un rayonnement électromagnétique sous forme de radiations infrarouges. Il s'agit d'une perte de chaleur se faisant sous forme d'ondes infrarouges. Mais avec le développement des appareils électriques, de très nombreux objets de notre quotidien fonctionnent avec les ondes électromagnétiques : téléphones portables, fours à micro-ondes, radiateurs, lignes à haute tension, écrans, ... L'objectif de ce module est de pose la problématique et de présenter les divers moyens de mesure et d'estimation de l'exposition de l'être humain. Une revue sur la réglementation et sur les divers niveaux de champs complète ce cours. Il est réalisé par un spécialiste du domaine. M7 : Data mining pour le risque Le domaine de la fouille de données permet l'extraction d'informations à partir des représentations (images satellites, photographies, données textuelles, …) dont on dispose pour gérer le risque. Ce module présente les divers outils utilisables dans ce contexte. M8 : Les sciences forensiques Ce module porte sur les sciences forensiques. Il est assuré par un intervenant qui appartient à l'Institut de Recherches Criminelles de la Gendarmerie Nationale. M9 : Gestion de connaissances et risque Le risque est un objet polysémique. Il nécessite une équipe pluri-disciplinaire et manipule des informations d'origines et de formats différents. La gestion de connaissance fournit des outils permettant de manipuler ces données et d'en tirer les synthèses nécessaires à la prise de décision.

**Prerequisites** Ce cours s'adresse à toute personne intéressée par la question du risque et désireuse de s'initier à un domaine qui tient une place prépondérante dans notre société moderne. Il ne nécessite a priori aucun pré-requis.

**Course exam** Le rapport rendu lors de l'étude de cas constitue le contrôle de ce module.

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|---|---|
| **Course code** | TPT14 |
| **Course title** | Introduction à SystemC |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | None |
| **Minimum level of French** | Good |
| **Key words** | SystemC, HDL, électronique, FPGA, ASIC, modélisation, hardware |
| **Language** | French |
| **Professor responsible** | Alexis POLTI |
| **Telephone** | +33 (0)1 45 81 70 56 |
| **Fax** | |
| **Email** | alexis.polti@telecom-paristech.fr |
| **Participating professors** | Alexis POLTI, Professor, TELECOM ParisTech |
| **Number of places** | Minimum: 12, Maximum: 32, Reserved for local students: 10 |
| **Objectives** | Les flots traditionnels de conception des circuits électroniques ne sont plus en mesure de prendre en compte la complexité des systèmes à concevoir. Pour remédier à cela, de nouveau langages de description et de modélisation de matériel ont été inventé, dont le plus répandu est SystemC.<br>Ce langage permet de décrire en C++ un circuit électronique (microprocesseur, SoC multi-processeur, …) et de gadrer ce même langage tout au long du flot de conception : spécifications, codage d'algorithme, partitionnement logiciel / matériel, co-simulation logicielle / matérielle, synthèse.<br>Ce cours a pour objectif d'enseigner les bases de SystemC. A la fin de ce cours, les étudiants seront en mesure de modéliser un système complet à base de cœurs de processeurs, de simuler son comportement, et d'en déduire des information cruciales sur ses performances (cache hits, cache miss, latences, …). |
| **Programme to be followed** | 1. Introduction à SystemC, rappels sur les HDL et les techniques de simulation<br>2. Modélisation SystemC :<br>a. types de données<br>b. éléments structurels : interfaces, ports, canaux, modules<br>c. éléments comportementaux : processus, événements<br>d. contrôle des simulation<br>3. Mise en pratique |

a. introduction à SocLib

b. modélisation d'un système à base de SPARC v8

c. simulation du système et extraction des performances

**Prerequisites**

o Bases d'électronique :

- o logique combinatoire, logique synchrone, pipe-lines
- o machines à états finis,
- o connaissance d'un HDL (Verilog ou VHDL)

o Bases d'architecture des processeurs :

- o ALU, cache, bus, hiérarchie mémoire
- o exécution des instructions, pipe-line

**Course exam**

Le travail demandé sera la modélisation et la simulation d'un système multi-processeur complexe en SystemC. On devra extraire de la modélisation les performances du système.

On notera le code du système modélisé et l'extraction de ses performances.

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|---|---|
| **Course code** | TPT15 |
| **Course title** | International Management and Economics |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | International, Global Economy, Cross-Cultural Management, Innovation Management |
| **Language** | English |
| **Professor responsible** | Gerard POGOREL |
| **Telephone** | +33 (0)1 45 81 81 11 |
| **Fax** | +33 (0)1 45 65 95 15 |
| **Email** | pogorel@telecom-paristech.fr |
| **Participating professors** | Gerard POGOREL, TELECOM ParisTech, Dpt of Economics and Management<br>Robert BRAID, Université de Marne-la-Vallée<br>Paul Van den BULCK, Ulys Attorneys, Brussels, Paris<br>Jean SCHMITT, Sofinnova Partners<br>Bruno LANVIN, INSEAD/World Bank |
| **Number of places** | Minimum: 12, Maximum: 24, Reserved for local students: 16 |
| **Objectives** | Providing an introduction and standard methodologies for a graduate-level education in Management and Economics in the present and future context of the world economy. The course addresses the needs of international careers in engineering and management. |
| **Programme to be followed** | - ICT and the global economy : an overview.<br>- Major trends in the world ICT economy.<br>- International management & communication.<br>- Communication theory/negociations.<br>- Law in an international context : legal systems and legal sources.<br>- Protecting software & inventions trough intellectual property law.<br>- Business presentations & communications.<br>- Team building and management.<br>- ICT and the global economy : the investor/innovator perspective.<br>- The implementation of corporate strategy. |
| **Prerequisites** | Initiation level in Economics and Management. |

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| **Course exam** | Written Assignment (1,5 hours) |
| | [3 credits] |

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|---|---|
| **Course code** | TPT16 |
| **Course title** | A Chaotic World |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | None |
| **Key words** | Chaos and cosmos, instability, non predictability, non integer dimensions, oscillators, discrete and continous, perturbations, weather, solitons, con-trol, attractor, phase space, Poincaré maps, routes to chaos, fractals, entropies, cellular automaton, neural nets, determinism, cri-sis, broken symme-try, metaphors, universality |
| **Language** | English |
| **Professor responsible** | Prof. Alain MARUANI |
| **Telephone** | + 33 (0)1 45 81 76 41 |
| **Fax** | + 33 (0)1 45 81 37 94 |
| **Email** | alain.maruani@telecom-paristech.fr |
| **Participating professors** | Pr. Alain MARUANI, ENST, Image and Signal Processing Department |
| **Number of places** | Minimum: 5, Maximum: 30, Reserved for local students: 5 |
| **Objectives** | The ideas and the applications of non-linearities, leading to chaos, have spread in many disciplines, giving an universal character to this new grid for reading our universe. This universality results in the installation of a new lan-guage, which diffuses finally into the ordinary language. The creation of forms, far from equilibrium, is an associated topic. It is remark-able that structurally simple systems can exhibit a profusion of compli-cated behav-iours and, reciprocally, that complex systems can exhibit an overall behaviour simple to describe.<br>The identification and the description of the evolution of a given system is at the origin of active research, important progress and substantial application. |
| **Programme to be followed** | Day 1<br>From linear to non linear, from stability to instability.<br>First examples : pendulum, prey and predator, kinetics<br><br>Day 2<br>Operational concepts :<br>attractors, regular and strange, bifurcations, exponents, autosimilar-ity, dimensions, examples of fractal |

sets

Day 3

(see Grading criteria, below)

Applications (image synthesis, acoustics, growth, …) and openings

Day 4

Let's visit some place.

Toolboxes for studying chaos. The laser as a metaphor

Day 5

Examination, comments and all that.

**Prerequisites**

Elementary calculus (differentiate a function, plot a curve …). Basic ideas in scientific education. Mainly, but not specifically, physics This course proposes openings towards various disciplines, as required by universality.

English language : at moderate level (scientific style and perhaps basic epistemologic considerations).

**Course exam**

On day 2, a general presentation will be made of various topics alluded to, but not dealt with in depth. Documentation can (or will) be provided. The stu-dents will choose a specific topic, corresponding to their skills, projects, general interests, or simply intellectual preferences. The topics will be applied or theoretical. The students will write a memo, of typically two pages, on this topic.

On day 5 (and, possibly, part of day 4), each student (or group of students) will be attributed five minutes and one transparency to defend his work. This duration can be modulated, accounting for the number of registrated students. Within this short period, the student is expected to rouse the audience's interest : questions and comments should follow from the audience, with a more comfortable place for discussion.

A quiz, with perhaps 30 simple questions will be proposed (to be replied at home or in the class, or from time to time), to check that most the basic concepts have been ingested. This quiz will not be noted : it's just to let you know where you stand.

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|---|---|
| **Course code** | TPT17 |
| **Course title** | Multimedia Indexing and Retrieval |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | multimedia, indexing, retrieval, multimedia document, sound and image processing, video, MPEG7, classification, document mining |
| **Language** | English |
| **Professor responsible** | Marine CAMPEDEL |
| **Telephone** | 33 (0)1 45 81 75 49 |
| **Fax** | |
| **Email** | marine.campedel@telecom-paristech.fr |
| **Participating professors** | Laurence LIKFORMAN (TELECOM ParisTech, Dpt Signal and Image), Hichem SAHBI (CNRS and TELECOM ParisTech, Dpt Signal and Image), Gael RICHARD (TELECOM ParisTech, Dpt Signal and Image), Isabelle BLOCH (TELECOM ParisTech, Dpt Signal and Image), Slim ESSID (TELECOM ParisTech, Dpt Signal and Image), Soufiane RITAL (TELECOM ParisTech, Dpt Signal and Image), Marco CAGNAZZO (TELECOM ParisTech, Dpt Signal and Image), Marine CAMPEDEL (TELECOM ParisTech, Dpt Signal and Image), Marin FERECATU (TELECOM ParisTech, Dpt Signal and Image), Rémi LANDAIS (Exalead) |
| **Number of places** | Minimum: 10, Maximum: 20, Reserved for local students: 10 |
| **Objectives** | Multimedia deals with sounds, images, videos and texts. Considering their growing number in our today lives (music/television records, personal photographies, web search, …) , it is urgent to develop efficient automatic processing to organize these documents, get information about their content and be able to easily retrieve them.<br>During the "Multimedia indexing and retrieval" week, you will discover state-of-the-art techniques concerning multimedia document management. You will also be able to criticize the proposed approaches and develop your own one. |
| **Programme to be followed** | The week is continuously balanced between highy technical conferences and active learning courses (group projects, practice, discussions).<br>The first day will be dedicated to generalities and classification tools. Groups and projects will be defined during this day.<br>Then each morning of the week is dedicated to a conference about: sound processing, image indexing |

and retrieval, video processing and EXALEAD point of view. These conferences are delivered by international experts; they will provide you with problematic and solution related to their own media, based on state-of-the-art technologies and research.

Afternoons are dedicated to discussions, projects and practices. This will be the occasion to go in deeper details on specific subjects according to your group interest. Practices on classification, sound and image indexing, relevance feedback will be proposed. TELECOM ParisTech multimedia mining platform PLATO will be presented.

The last afternoon will be used for evaluations and concluding discussions.

**Prerequisites** Basic knowledge on image and sound processing is required as well as notions about automatic classification.

**Course exam** Oral presentations of the group projects and written reports will be used to evaluate the students work.

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| **Course code** | TPT18 |
| **Course title** | Intrication quantique pour les télécommunications |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | None |
| **Minimum level of French** | Good |
| **Key words** | photons intriqués, génération paramétrique, optique quantique, mesure de Bell, téléportation quantique |
| **Language** | French |
| **Professor responsible** | Isabelle ZAQUINE |
| **Telephone** | + 33 (0) 1 45 81 78 39 |
| **Fax** | + 33 (0) 1 45 81 76 46 |
| **Email** | isabelle.zaquine@telecom-paristech.fr |
| **Participating professors** | Isabelle Zaquine (TELECOM ParisTech, Traitement du Signal et des Images)<br>Eleni Diamanti (TELECOM ParisTech, Informatique et Réseaux)<br>Robert Frey (TELECOM ParisTech, Traitement du Signal et des Images)<br>Jean-Loup Smirr (TELECOM ParisTech, Traitement du Signal et des Images) |
| **Number of places** | Minimum: 10, Maximum: 30, Reserved for local students: 0 |
| **Objectives** | L'intrication quantique est la ressource de base des futurs relais ou répéteurs quantiques. L'objectif est de maîtriser totalement cette notion, à la fois sur le plan de la théorie quantique et sur celui de la réalisation physique des états intriqués, à l'aide de l'optique non linéaire. |
| **Programme to be followed** | Bases de physique quantique, principe de superposition, états à plusieurs particules, notion d'intrication, paradoxe EPR<br>Introduction à l'optique non linéaire<br>Processus d'ordre deux, doublement de fréquence, accord de phase, quasi-accord de phase, génération paramétrique<br>Photons intriqués en polarisation ou en temps/énergie<br>Réalisation de sources de photons intriqués<br>Etude de la lame séparatrice, interférences de photons uniques, interférences à deux photons.<br>Expériences de téléportation, de transfert d'intrication<br>Interfaces de changement de longueur d'onde<br>Mémoires quantiques.<br>Protocole de cryptographie quantique avec des états intriqués.<br>Une démonstration de source de photons intriqués sera faite au laboratoire d'optique non linéaire pour |

les communications quantiques de TELECOM ParisTech.

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| **Prerequisites** | Electromagnétisme classique, équations de Maxwell. |
| **Course exam** | Contrôle écrit, questionnaire à réponses ouvertes courtes. |

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|---|---|
| **Course code** | TPT19 |
| **Course title** | Digital design : objects in progress |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | ENSCI-Les Ateliers – 48, rue Saint Sabin – 75011 Paris |
| **City** | Paris |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Good |
| **Minimum level of French** | Good |
| **Key words** | digital design, interaction, interface, pervasive network, ubicomp, design of ICT |
| **Language** | English |
| **Professor responsible** | Annie GENTES |
| **Telephone** | + 33 (0) 1 45 81 80 28 |
| **Fax** | + 33 (0) 1 45 65 95 15 |
| **Email** | annie.gentes@telecom-paristech.fr |
| **Participating professors** | Jean-Louis FRECHIN, Designer – Head of ENSCI Digital design department<br>David BIHANIC, Assistant professor in interaction design, University of Clermont Ferrand 1<br>Annie GENTES, Associate professor in information and communication sciences, TELECOM ParisTech |
| **Number of places** | Minimum: 10, Maximum: 30, Reserved for local students: |
| **Objectives** | Objective : developing digital design projects. This course is co-organized by TELECOM ParisTech and ENSCI-Les Ateliers (Ecole Nationale Supérieure de Création Industrielle).<br>Digital design faces several problems : first, digital products can take whatever shape we want but then it is difficult to figure what they are for ; second, design is confronted to the general decline of consumption. These particular circumstances raise challenges for the conception of digital objects: how to conceive them ? How are they going to be adopted by the public? What are the new roles and functions of the user in the invention and transformation of these products? How to conceive services within technical systems ? How can design give a special place to users and what is that place going to be : users and makers of the technical systems ? |
| **Programme to be followed** | This course takes place at : ENSCI-Les Ateliers – 48, rue Saint Sabin – 75011 Paris<br>Students will work in small competing groups. They will conceive scenarios and mock ups of interfaces or objects that can be adopted or transformed by the end-users. Their work will be supervised by designers and media researchers explaining both design processes and digital specificity. |
| **Prerequisites** | Students should have some knowledge either in photoshop, flash or dreamweaver.<br>It is also strongly advised that students look into examples of digital services, interfaces, objects where |

the user has some latitude in the evolution of the product, before attending the workshop.

**Course exam** File on the designed project and formal presentation of the interface or service.

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|---|---|
| **Course code** | TPT22 |
| **Course title** | Atelier de mise en théâtre du Web |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 3rd year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | Good |
| **Key words** | |
| **Language** | French |
| **Professor responsible** | Olivier FOURNOUT |
| **Telephone** | + 33 (0) 1 45 81 80 24 |
| **Fax** | + 33 (0) 1 45 65 95 15 |
| **Email** | olivier.fournout@telecom-paristech.fr |
| **Participating professors** | Sylvie Bouchet. Formée à la mise en scène au studio Pygmalion, enseignante vacataire à TELECOM ParisTech, à l'Ecole des Ponts ParisTech, au CELSA-Paris IV, consultante en entreprise, auteure de théâtre et dramaturge (Festival d'Avignon off 2006-2008, Aktéon Paris 2008, Ciné13 2006-2007).<br>Olivier Fournout, enseignant chercheur à TELECOM ParisTech, travaille sur les dialogues médiés par ordinateur et enseigne la dynamique de groupe appliquée aux situations de négociation et de leadership. Il porte le projet de recherche "Brèves d'écran" qui explore les possibilités de mise en théâtre du web comme un outil de recherche. Il a été pendant plusieurs années critique de théâtre, et a une expérience de mise en scène de pièces et courts métrages. |
| **Number of places** | Minimum: 6, Maximum: 12, Reserved for local students: 4 |
| **Objectives** | L'objectif principal de ce cours est de développer les capacités de créativité et d'expression des étudiants, en proposant un travail de mise en théâtre de l'imaginaire d'internet. Plusieurs apprentissages en découlent:<br>- Techniques théâtrales: s'initier à l'improvisation, à la construction narrative, à l'investissement dans un rôle, à la mise en scène.<br>- Expression orale: s'affirmer devant un public, améliorer sa prise de parole et son écoute en situation d'interaction.<br>- Conduite d'un projet collectif: élaborer en équipe un spectacle court (20mn), éventuellement filmé.<br>- Culture de l'internet: comprendre la richesse d'interprétation des situations de communication sur les nouveaux médias informatiques.<br><br>Au départ, un constat : l'internet se présente souvent comme un lieu de rencontre, de dialogue et de |

| | |
|---|---|
| | mise en communauté d'activités aussi bien professionnelles que de loisirs. L'hypothèse fondatrice est que la mise en théâtre des communications par le réseau est capable d'en révéler, au-delà de la fonction de transfert d'informations, les dimensions émotionnelles, affectives, corporelles, stratégiques, imaginatives, de plaisir, de violence, de course au contact, de jeu de masques etc. |
| **Programme to be followed** | Les étudiants seront les maîtres d'oeuvre d'un authentique travail créatif, représentant un regard sur la société de l'information.<br><br>Ils appréhenderont les 4 phases du travail créatif :<br>1) La mise en condition des acteurs par l'entraînement aux techniques théâtrales de base: échauffement, écoute, improvisation, mise en espace et en actions d'émotions, sentiments, désirs…<br>2) Le montage d'un dossier créatif sur l'internet, pouvant servir de source d'inspiration pour la mise en théâtre<br>3) La création du spectacle : 2 ou 3 créations de 20 mn (en sous-groupes)<br>4) Les représentations finales, éventuellement filmées.<br><br>En milieu de semaine, ils assisteront à la projection d'un film documentaire : il s'agit du making-of d'un film de fiction, montrant la dynamique de groupe et la dimension de management de projet de la production culturelle. Cette séance sera en anglais, et commune avec le cours Athens "Managing communication in an international context". |
| **Prerequisites** | Un intérêt pour l'art théâtral, ainsi que la motivation pour s'engager dans une mini-production, sont évidemment souhaités. Une expérience théâtrale préalable est bienvenue, mais nullement prérequise. Un niveau minimal en anglais est indispensable pour la séance de projection. |
| **Course exam** | La note finale sera fondée sur la qualité et la régularité de la participation et de l'investissement créatif tout le long de la semaine, dans ses différentes phases. |

| | |
|---|---|
| **Course code** | TPT23 |
| **Course title** | Digital Signal Processing, case studies |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault- 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Good |
| **Minimum level of French** | None |
| **Key words** | Auto-regressive model, Least squares approach, Recursive filter, Kalman filtering, Viterbi decoding, Principal component analysis |
| **Language** | English |
| **Professor responsible** | Gérard BLANCHET |
| **Telephone** | + 33 (0) 1 45 81 74 19 |
| **Fax** | + 33 (0) 1 45 81 37 94 |
| **Email** | gerard.blanchet@telecom-paristech.fr |
| **Participating professors** | Gérard BLANCHET, Professor, TELECOM ParisTech, Dpt Signal and Image Processing<br>Maurice CHARBIT, Professor, TELECOM ParisTech, Dpt Signal and Image Processing |
| **Number of places** | Minimum: 10, Maximum: 24, Reserved for local students: |
| **Objectives** | This course aims to introduce students to some basic approaches in the field of digital signal processing. Each topic is illustrated by a labwork on Matlab®.<br>As for teaching, research and development, simulation plays an important role. In the first case it helps students assimilate theoretical concepts. In the second and third cases, the simulation becomes an effective tool to achieve useful results, particularly in the absence of theoretical results. Digital Signal Processing includes number of topics from basic spectral analysis up to statistical theory, and Monte-Carlo methods. The session consists of five case studies illustrating some of these areas. They deal with various subjects such as AR-modelling, Recursive filtering, Viterbi decoding, Principal Component Analysis. |
| **Programme to be followed** | Each day will be organized with a course in the morning from 8h30 to 11h45, and a labwork in the afternoon from 13h30 to 16h45.<br>1 Speech signal processing: pitch detection, linear prediction. 2 Recursive least squares (RLS), weighted RLS. 3 Viterbi algorithm for soft decoding. 4 Adaptive filtering; the linear gaussian case and the Kalman filter. ; 5 Principal Component Analysis, eigenfaces.<br>**Labs** A key feature of this course is the use of practical computational exercises, based on Matlab®, in which methods are implemented and evaluated by the students. The intended outcomes of the course are to provide students with the theoretical and practical skills necessary to design, implement and |

evaluate algorithms.

**Material** Hard copy of the slides and lecture notes.

**Bibliography** Blanchet, G., M. Charbit (2005). Digital Signal and Image Processing using Matlab®. New-York, ISTE London, ISTE Newport Beach.

Cappe, O., E. Moulines, et al. (2005). Inference in Hidden Markov Models. New-York, Springer.

**Prerequisites** Basic level in signal processing.

**Course exam** Final grade will be based on laboratory reports (one for each Lab).

| | |
|---|---|
| **Course code** | TPT24 |
| **Course title** | Web search |
| **Institution** | TELECOM ParisTech (formerly known as Ecole Nationale Supérieure des Telécommunications) |
| **Course address** | TELECOM ParisTech - 46 rue Barrault - 75013 Paris |
| **City** | Paris |
| **Minimum year of study** | 4th year |
| **Minimum level of English** | Fair |
| **Minimum level of French** | None |
| **Key words** | Web, search engine, crawler, information retrieval, graph mining |
| **Language** | English |
| **Professor responsible** | Pierre SENELLART |
| **Telephone** | + 33 (0) 1 45 81 77 59 |
| **Fax** | + 33 (0) 9 56 71 19 06 |
| **Email** | pierre.senellart@telecom-paristech.fr |
| **Participating professors** | Bogdan CAUTIS, TELECOM ParisTech, Dpt Computer Science |
| **Number of places** | Minimum: 10, Maximum: 30, Reserved for local students: |
| **Objectives** | The purpose of this course is to understand and put to use the technologies behind Web search engines such as Google or Yahoo!, technologies that are equally useful in other contexts (e.g., digital libraries, e-commerce, artificial intelligence). The main thematics include basics of Web languages and protocols, Web crawlers, (text) information retrieval, graph mining algorithms, Web advertisement and recommendation systems. |
| **Programme to be followed** | The course will be organized as follows: in the mornings, five lessons will be given, on topics detailed below. In the afternoons, labs will serve to apply on concrete examples the concepts seen during the course. Here is the outline of the course:<br>1. Monday: The World Wide Web, Web Crawlers<br>- Internet, the World Wide Web, HTML, URLs<br>- Web Crawlers, Robots Exclusion Protocol<br>2. Tuesday: Information Retrieval<br>- Textual Preprocessing, Text Indexing, tf-idf, BM25, Language Models<br>- Text Mining, Clustering, Top-k Algorithms<br>3. Wednesday: Graph Mining<br>- The Web as a Graph, Specificities of Real-World Graphs<br>- PageRank and HITS, Graph Clustering<br>4. Thursday: Web Advertisement and Recommendation Systems |

- Technical and Economic Model of Web Advertisement
- Item-Based and User-Based Collaborative Filtering

5. Friday: Hot Topics in Web Search
- Social Networks: searching for communities and users, searching for content
- Information Extraction, Deep Web
- Deep Web: access to the information hidden behind HTML forms
- Web 2.0, Semantic Web: how to search new types of websites.

**Prerequisites** Students are assumed to have some knowledge of programming in Java. This language will be used during the labs, along with various libraries adapted to the different topics.

**Course exam** Students will have to hand over their lab assignments at the end of each lab session, which will be evaluated. The global mark for this course consists in the unweighted average of the mark given for each lab session.

## ATHENS PROGRAMME STUDENT COMMITMENT:

### REGISTRATION: CONDITIONS & STUDENT RESPONSIBILITIES

-Exchange students that are currently studying at a member ATHENS institution (ERASMUS, Double Diploma students) will not be permitted to return to their Institution and their town of origin to follow an ATHENS Session.

-Erasmus Exchange students whose exchange is officialised by a **Learning Agreement**, must inform their Home Institution of origin of their intention to participate in an ATHENS Session.

**-** All students participating in an ATHENS Session are responsible for being insured during that Session.

- Once registered for an ATHENS course :
  - Students commit themselves to attending that course. **Only in the case of major and unforeseen problems**, will Home Institutions permit their students to cancel that registration. All cancellations require the agreement of an official representative of the Home Institution (Director of Studies, Head of Department, Professor in charge of the student's studies, ATHENS General Administrator.).
  - ***S*tudents who cancel will be expected to cover all costs caused by this cancellation**.

### OBLIGATIONS FOR OBTAINING CREDIT FOR THE COURSE FOLLOWED

- No credit will be awarded to students who are not officially registered (by their Home Institution) for a course.
- **Students are expected to follow the entire course programme** in order to receive credit for the course followed.
- In the case of absences during a course, students will receive the mark of 0 unless the absence can be justified: either such students present themselves to the Professor/Course Organiser to explain the reasons for the absence, or they show, that for medical reasons, they could not be present (a medical certificate is thereby required). In all cases, the Professor/Course Organiser will decide on the justification of the absence.
- Improper behaviour can have an effect on the final mark awarded to a student. Home institutions will be notified by course organising institutions of cases of improper behaviour. A bad final mark for a course may have consequences on the bursary granted to a student by his/her Home institution.
- All students are expected to validate the ATHENS course followed by passing the "course exam", the form of which is decided by the professor, responsible for the course. It may be an exam at the end of the course or a project or personal research to be sent to the professor on a specific date. No derogation will be accepted. Students who do not respect this Deadline, will receive a mark of 0.
- In order to obtain credit for an ATHENS course, all students are expected to complete the Student Evaluation Form.

### ATHENS SESSIONS ABROAD

**All ATHENS Sessions abroad consist of two elements: (1) a 5 day course** at the receiving institute and, (2) **a European Dimension Programme of normally 2 or 3 days**, depending on what is offered by the receiving institution. This ED-Programme may be planned during the weekend preceding the course period, during the 5-weekdays of the course as well as during the weekend, following the course.

- **Student participants commit themselves to following the entire Session Programme as described above. Only students who participate in both the course programme and European Dimension Activities will be eligible for an ATHENS bursary. Students who do not pay the European Dimension Fee, will not receive a certificate with marks for their course.**
- Depending on their institution of origin, students may benefit from financial aid for their stay abroad. This bursary can cover part of the travel and living costs involved in the stay.
- The student participants are responsible for being insured during the Session abroad; they are also expected to assume the cost of lodging and meals.
- All students requesting assistance in finding **housing** from the course organising institution must expect to find very **"simple forms of lodging"**. Once such a request has been made, such **students are expected to occupy that lodging for the entire period of their stay**, unless, for major and unexpected reasons they must leave that lodging, or have been forced to shorten their stay.
- During their stay at the foreign institution, participating students are expected to inform local ATHENS General Administrators of any problems which may arise. This must be done **prior to any action** taken on the part of the students. If necessary, the local ATHENS representative will contact the Institution of origin in order to find a solution to the problem at hand.
-

**NAME:** **UNIVERSITY OF ORIGIN:**

**I have knowledge of the above mentioned text. Signature of the student:**

# For ATHENS STUDENTS : THINGS TO KNOW

**1.When registering :**

- **Make 3 or more course choices :** so as to obtain at least one of these choices
- **Be sure :** you are able to fund the costs (travel, and living costs) & that you are « free » to leave your university over the ATHENS Session dates
- Make sure data is valid on your registration form (e.g. housing)
- **Read and sign the Student Commitment**

**2. After Registration :**

- Obtain confirmation from your Home institution prior to Registration that you can participate in the Session and for one of your course choices.
- Check on visa requirements.

**3.Acceptance for a Session, What it Means :**

- You are **committed** to following the course officially awarded to you by the Central Selection Committee in Paris.
- **No course changes are possible unless** they are arranged before your departure and in agreement with your local ATHENS Administrator and the local Administrator of the hosting institution.

**4. So as to arrive on time and not miss anything :**

- Check the Web site « European Dimension Activities » to see when you are expected to arrive at the course site for the Opening of the Session and when you are expected to leave.
- Reserve as soon as possible your travel arrangements

**5. For Further information :**

- Consult only your local ATHENS Administrator if you have questions on the Programme.
- Final Details on the Session will be available on the WEB (housing, European Dimension Programme, meeting point etc) some 9 days before the Session.

**6. Problems just before or during the Session :**

- Each ATHENS site will have an emergency number to be used **only** in case of emergency.

**7. During the Session, your obligations :**

- You are expected to attend and to actively participate in the course you are following as well as pay for and follow the European Dimension activities.

**8. Remember Your Role as an ATHENS Student :**

- You are not a simple tourist; **you represent your Home institution.**

**9. Student Evaluations : Your judgement of the course followed :**

- Students are asked to complete an Evaluation questionnaire at the end of their ATHENS course, and if possible, on-line. Student evaluations help the Programme to develop. Students' comments are included in the ATHENS Final Report, published twice a year.

**10. Marks:**

- Marks for the course followed are placed on the Web approximately 1 1/2 months after the end of the Session. An ATHENS course is generally worth 2 to 3 ECTS credits.
- No re-exam is permitted under the ATHENS Programme except for "exceptional" and unusual circumstances. Moreover, re-exam is solely at the Professor's/Course Organiser's discretion, and according to the regulations of the Host institution. If a student questions the Mark he has been awarded for a course for the Session just followed, he should consult his Local Coordinator. Should the Local Coordinator consider that additional information is necessary, he/she will consult the Local Coordinator of the hosting institution who will in turn consult the Professor responsible for the course.

SAMPLE – Evaluation. Completion will be carried out via the WEB.

**STUDENT EVALUATION FORM : MARCH 2009 COMPLETE ATHENS SESSION**

**To be COMPLETED BY ALL STUDENTS *at the end of the course :*** Please reply to each question by encircling a corresponding numerical ECTS value from 1-5, with 1 being a very low level (not sufficient), 3 being average (acceptable) and 5 being of a top level (excellent).

LAST NAME AND FIRST NAME : .....

INSTITUTION OF ORIGIN : .....

TITLE AND NUMBER OF THE COURSE …….

**1)THE COURSE :**

| | | | | | |
|---|---|---|---|---|---|
| How sufficient was the level of your previous background? | 1 | 2 | 3 | 4 | 5 |
| How closely did the course follow the published description? | 1 | 2 | 3 | 4 | 5 |
| Was the course content well-adapted (5), not at all (1)? | 1 | 2 | 3 | 4 | 5 |
| The use of audio-visual equipment? Effective (5), Ineffective (1)? | 1 | 2 | 3 | 4 | 5 |
| How sufficient was the documentation? | 1 | 2 | 3 | 4 | 5 |
| How good were the pedagogical methods used? | 1 | 2 | 3 | 4 | 5 |
| What do you think the value of the technical visits was? | 1 | 2 | 3 | 4 | 5 |
| Your work during the week? Good load (5), much to high, too little (1)? | 1 | 2 | 3 | 4 | 5 |
| How do you judge the welcome given by the course hosting institution? | 1 | 2 | 3 | 4 | 5 |

**For the Course, as a whole, what were the:**

**STRONG ASPECTS :**

**WEAK ASPECTS :**

**POSSIBLE IMPROVEMENTS:**

**Globally, how do you judge the value of this course?**

1 2 3 4 5

What course topics would you be interested in following at a future ATHENS Session?

**Is this course part of you required programme ? Yes No**

**Does this course make you ant to come back to the course organising institution ? Yes □ No □**

**2)THE SESSION:**

| | | | | | |
|---|---|---|---|---|---|
| How do you judge the welcome given by the host institution? | 1 | 2 | 3 | 4 | 5 |
| How high was your interest in the European Dimension Activities? | 1 | 2 | 3 | 4 | 5 |

**Comments, suggestions on the European Dimension Activities :**

*« Formulaire d'évaluation pour l'étudiant »*

**POUR LA SEMAINE EUROPEENNE/ ATHENS**

**Session de mars 2009**

*(uniquement pour les étudiants de ParisTech ayant suivi un cours à Paris)*

## *Ce questionnaire doit être complété à la fin du cours*

***(entourer votre réponse, svp)***

NOM ET PRENOM : .....

ECOLE D'ORIGINE : .....

TITRE DU COURS CHOISI : .....

***Système de valeur de 1 à 5 (1: très insuffisant; 3 : acceptable; 5 :excellent)***

| | | | | | |
|---|---|---|---|---|---|
| Niveau de votre prérequis pour aborder ce cours ? | 1 | 2 | 3 | 4 | 5 |
| Niveau de conformité avec le programme annoncé ? | 1 | 2 | 3 | 4 | 5 |
| Durée du cours bien suffisant (5) ou non (1)par rapport au programme? | 1 | 2 | 3 | 4 | 5 |
| Moyens audio-visuel utilisés, adaptés (5) ou pas (1) ? | 1 | 2 | 3 | 4 | 5 |
| Documentation distribuée ? | 1 | 2 | 3 | 4 | 5 |
| Méthodes pédagogiques? | 1 | 2 | 3 | 4 | 5 |
| Valeur ajoutée des cours hors de votre école ? | 1 | 2 | 3 | 4 | 5 |
| Valeur ajoutée des visites ? | 1 | 2 | 3 | 4 | 5 |
| Votre travail personnel durant le cours ? Normal (5), trop ou pas assez (1). | 1 | 2 | 3 | 4 | 5 |
| Votre jugement sur la structure d'accueil? | 1 | 2 | 3 | 4 | 5 |

**VOTRE BILAN DE CE COURS**

**POINTS FORTS :**

**POINTS FAIBLES :**

**AMELIORATIONS POSSIBLES:**

**Globalement comment estimez-vous ce cours**

1 2 3 4 5

**Quel autre thème souhaiteriez-vous traiter durant une semaine "Semaine Européenne"/ATHENS ?**

**Ce cours, fait-il partie de votre programme d'études obligatoire ? OUI □ NON □**

**A la suite de ce cours, avez-vous envie de revenir faire des études à l'institution d'accueil ? OUI □ NON □**

**Course Organiser EVALUATION FORM : March 2009 ATHENS SESSION**

We would like to have your reactions to the course you taught at the last ATHENS Session and the group of students involved. Could you kindly reply to each question by encircling a corresponding numerical value from 1-5, with 1 being a very low level (not sufficient), 3 being average (acceptable) and 5 being of a top level (excellent).

LAST NAME AND FIRST NAME : .....

INSTITUTION: .....

INSTIUTION WHERE THE COURSE WAS TAUGHT…….

| | | | | | |
|---|---|---|---|---|---|
| How sufficient was the level of the students' background? | **1** | **2** | **3** | **4** | **5** |
| How closely did your course follow the published description? | **1** | **2** | **3** | **4** | **5** |
| How pleased are you with the attitude of the students during the course? | **1** | **2** | **3** | **4** | **5** |
| How active was the student participation during the course? | **1** | **2** | **3** | **4** | **5** |
| Was the work load for students high (5) or low (1) during the week? | **1** | **2** | **3** | **4** | **5** |

**Globally, how do judge the group of students following this course?**

**1 2 3 4 5**

**For the Course, as a whole, what were the:**

**STRONG ASPECTS :**

**WEAK ASPECTS :**

**ORGANISATIONAL ASPECTS:**

**MODIFICATIONS YOU WOULD YOU LIKE TO MAKE:**

**Comments you would like to make concerning your course, the students, the session and the ATHENS Programme in general :**

# Member Institutions

# Les Institutions membres

# AUT : Aristotle University of Thessaloniki (AUT)

AUTh is the largest university in Greece: 7 Faculties organized into 33 Schools, 5 single-School Faculties and 4 independent Schools. 86000 undergraduate and 9000 postgraduate students. Teaching and Research Staff: 2330 persons, Scientific Teaching Staff and Laboratory Staff: 409, Technical Laboratory Staff: 412, Administrative staff: 973 persons (update 31-8-06).

**The AUTh at a glance**
**Faculties:** Theology; Philosophy; Sciences; Law, Economics and Political Sciences; Agriculture; Forestry and Natural Environment; Veterinary Medicine; Medicine; Dentistry; Engineering; Fine Arts; Education
**Independent Schools:** Pharmacy; Physical Education and Sports Science; Physical Education & Sports Science in the city of Serres; Journalism and Mass Media Studies.

**Schools of the Faculty of Engineering**
Civil Engineering; Architecture; Rural and Surveying Engineering; Mechanical Engineering; Electrical & Computer Engineering; Chemical Engineering; Mathematics, Physics & Computational Sciences; Urban-Regional Planning and Development Engineering in the city of Veroia.
Each School (except for the School of Mathematics, Physics and Computational Sciences that covers the introductory courses of all the Schools of the Engineering Faculty) offers BA degrees. All Schools offer MSc and PhD degrees.

**Student and teaching Staff mobility of the AUTh**
ERASMUS: About 600 outgoing students and 500 incoming (the largest mobility of all Greek universities). About 120 outgoing teaching staff members and 100 incoming (among the largest motilities in Europe). For other international activities see the university web page.

**Research Activity:** In the past 5 years, over 3500 research and technological development projects have been carried out at the AUTh. Research funding in the past 5 years has reached 15 million euro. 12000 external associates have been employed in the projects, making AUTh one of the biggest scientific employers nationwide.
**University web page**: http://www.auth.gr/home/index_en.html

**ATHENS Contact Person :** Aris Avdelas, professor

Institute of Steel Structures / Faculty of Engineering/ Aristotle University of Thessaloniki

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Tel. +30 2310 995784 Fax. +30 2310 995642 email: avdelas@civil.auth.gr

# Budapest University of Technology and Economics (BME)

BME was founded in **1782** by Austrian Emperor Joseph II. Nowadays it is a research university, one of the largest Hungarian higher education institutions, the numbers of **students** and professors are about **25.000** and 1.300 correspondingly.

The traditional **goal** of the Budapest University of Technology and Economics **is to train professional engineers** who are capable of high-level creative technical work, who can organize and supervise production and infrastructure, and who are qualified to perform scientific research, participate in technical development, solve engineering problems and implement solutions. In addition to educating engineers and teachers of engineering, the University **provides training of specialists in economic and natural sciences**, and **continuing education** through:

- graduate programs in engineering specializations, including those for the managers of technical plants,
- refresher courses to inform professionals about new scientific developments which affect their work,
- doctoral programs, guidance and instruction for scientific research fellows.

The University takes special pride in the contributions made to Science, Engineering, and Culture through its faculty, graduates, and researchers. Several **Nobel Prize laureates** have been associated with the Budapest University of Technology and Economics: Dennis Gábor (Physics), George Hevesy (Chemistry), Eugene Wigner (Physics), György Oláh (Chemistry) and János Harsányi (Economics). **Notable personalities** have also studied or taught at BME: John von Neumann, one of the inventors of the computer ; Edward Teller, nuclear physicist ; Leo Szilárd, known for his work on nuclear chain reactions ; Marcell Breuer, architect ; Theodore von Kármán, aerodynamic scientist ; Erno Rubik, inventor of the famous cube ; Donát Bánki, co-inventor of the carburetor ; Károly Zipernowszky, one of the inventors of the transformer ; Dénes Mihály, one of the inventors of television.

**Organisation and Administration of the University**. The Budapest University of Technology and Economics functions under the supervision of the Hungarian Ministry of Education. The executive functions of the university are carried out by the University Senate and the Rector. BME has 8 faculties: Architecture, Chemical Engineering, Civil Engineering, Economic and Social Sciences, Electrical Engineering and Informatics, Mechanical Engineering, Natural Sciences, Transportation.

**Education.** The Budapest University of Technology and Economics offers higher educational training on different levels (2, 3, 5, 8 years). At this moment (2008) approximately a third of the students takes part at 5 years engineering programs (considered equivalent to M.Sc.). The Bologna type education (B. Sc, M. Sc, Ph. D) has been fully introduced from 2006. Besides Hungarian there are training programs in English, French, German as well. BME has important international relations and is an active participant of different international programs (mainly European, e.g. Erasmus), but it has good contacts with several American, Asian universities as well. BME joined the ATHENS program 7 years ago. For more information related to international programs see www.tanok.bme.hu .

**For More Information about the university in general:** http://www.bme.hu

# Czech Technical University in Prague (CVUT)

Czech Technical University in Prague is **the oldest technical university in Central Europe (founded in 1707)** and the largest such University in the Czech Republic (**over 24 000 students**). Other important dates in the history of the University are 1803, when the studies were reformed on the model of the Ecole Polytechique de Paris; 1869, when the formerly bilingual University was divided into separate Czech and German institutions; 1920, when the Czech Technical University in Prague was formed, and 1989, when the so-called velvet revolution led the University back into close contact with western Europe.

**The university has seven faculties: Civil Engineering, Mechanical Engineering, Electrical Engineering, Nuclear Sciences and Physical Engineering, Architecture, Transportation Sciences, and .Biomedical Engineering.** There are also a number of institutes and a Business and Innovation Centre.

Traditionally students take an 11 or 12 semester full-time study programme leading to the Inzenyr (Ing.) diploma, equivalent to a Master's degree. There are at present over 1 500 students working on PhD programmes.

**Some Bachelor programmes** have been established in the last 12 years, and the university is now going over **to the Bachelor - Master - PhD system**. The European Credit Transfer System (ECTS) is in use at all faculties.

After the period of isolation (1938 – 1989) the University has engaged enthusiastically in international activities, which it regards as a source of a wide range of positive influences. In general, the University is happy to join in with all efforts to harmonize European and international education and to remove barriers to international cooperation in education and research.

**For more information: http://www.cvut.cz/en International Office: http://www.cvut.cz/incomers/international**

# Instituto Superior Técnico Lisboa (IST)

Part of the Universidade Técnica de Lisboa (Technical University of Lisbon), the Instituto Superior Técnico (IST – Higher Technical Institute) aims to contribute to the development of society by providing top quality higher education in the areas of Engineering, Science,Technology and Architecture, at undergraduate and postgraduate levels, as well as developing Research, Development and Innovation (RD&I) activities to allow it to provide teaching in line with the highest international standards.

Its mission is therefore expressed in the three functions which characterise the concept of a modern university - Teaching, RD&I, and Links with Society, so as to:
> Create knowledge
> Train skilled professionals
> Transfer and apply knowledge

**Education**
Within the context of its main function, IST's objective is to provide a thorough basic training in Engineering, Science, Technology and Architecture, which, allied to the acquisition of a wide range of social and human skills, enables its graduates to act as agents for change and innovation in society. The intention is to provide education in line with the highest international standards, meeting the needs of society in general, and of the economy in particular. Under the Bologna Process changes introduced in IST for the 2006/2007 academic year, the five year degree courses have been changed into integrated five year Master's degree courses or into courses organised into two successive cycles conferring, respectively, a Bachelor degree and a Master's degree (three + two years). With regard to undergraduate teaching, IST offers 12 courses organised into two successive cycles, and nine integrated Master's courses.

IST undergraduates, which currently number about 8500, thus have access to an educational model with the same standards as those found in the best European universities. As IST belongs to the CLUSTER network, the new curricula are in accordance with the highest standards foreseen in the network. In terms of postgraduate teaching (3rd Cycle), IST offers 17 advanced courses leading to the award of an Advanced Training Diploma *ATD). Students obtaining such a diploma have in depth technical knowledge in a specialised area, equivalent to a higher professional qualification.

The Technical University of Lisbon, through IST, awards doctorates (PhDs) in 20 scientific areas. Doctoral students represent around 6% of the total number of students at IST. Between 2001 and 2005, 453 PhDs were awarded. IST also offers specialised courses, not leading to an academic degree, which are designed mainly for graduates working in the business community who wish to specialise in a particular area of activity.

**Research, Development and Innovation**
http://www.ist.utl.pt/html/id/
The quality of teaching at a university is what differentiates some institutes from others. This quality depends on the RD&I activities of the institutes, which lead to the generation of knowledge and enable high standards of academic excellence to be achieved. IST has a prominent position in RD&I, not only at a university level, but also in the broader Portuguese scientific and technological community. This position derives from the dynamism and scientific excellence demonstrated by its teaching staff and researchers. Research at IST is basically carried out in research centres and institutes. Funding for RD&I comes mainly from the European Union, the Portuguese Science and Technology Foundation ("FCT"), and national and international industry.

In 2002/2003, an assessment of research units, funded by the Portuguese Ministry of Science and Technology and carried out by panels of international experts, awarded a classification of *Excellent* or *Very Good* to 27 of IST RD&I units, out of the 34 (*) units in operation. The proportion of researchers with PhDs working in the units classified as *Excellent* or *Very Good* is 92% of the total.

(*) Four of these units are private, non-profit making institutions, of which IST is an associated institution.

**Links with Society and Internationalisation**
http://www.ist.utl.pt/html/sociedade/
IST's links with society take the form of educational activities, the provision of services, the spreading of knowledge and technology transfer. IST is involved with some of the most prestigious RD&I and technology transfer institutions in Portugal, such as IDMEC (mechanical engineering), ISR (robotics), IT (telecommunications), INESC and INESC-ID (systems engineering and computers), ICIST (civil engineering and architecture), and ICEMS (materials and surfaces). Participation in these institutes is an important mechanism for establishing links with the business world. IST is also the second largest shareholder in Sociedade Tagusparque, SA, which manages the country's largest science and technology park, in Oeiras. IST holds the chair on that company's board of directors and is also represented on its scientific and

technological council. IST is committed to increasing steadily the specialised and updating courses of variable duration that it provides for graduates, thus contributing to the development of society. The role played by the IST Press publishing unit should also be mentioned, because of the importance of its scientific and technological publications. As an institution or via the members of its component parts, IST participates in many sectors of national and international life of relevance to the regions of which Portugal is a part, particularly Europe and the Portuguese-speaking countries. On the European level, IST is a member of several networks comprising counterpart schools of renown, such as the CLUSTER, CESAER and TIME networks. In this context, reference should be made to the international connections established through the SOCRATES/ERASMUS programme, and through groups such as IAESTE (International Association for the Exchange of Students for Technical Experience) and BEST (Board of European Students of Technology).

**For More Information :**
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GRI - International Relations Office - Av. Rovisco Pais - 1049-001 Lisboa - Portugal
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http://www.ist.utl.pt
http://gri.ist.utl.pt

# Istanbul Technical University (ITU)

The history of Istanbul Technical University dates back to the Ottoman Empire when it was founded in 1773 as a Royal School of Naval Architecture. Ever since its founding ITU strives to continue to expand its development as a dynamic world university with a mission to provide education, conduct research, and initiate technological developments as a university competing in a rapidly globalizing world.

ITU is located in Istanbul, once known as the capital of capital cities and has many unique features. It is the only city in the world to straddle two continents, and the only one to have been a capital during two consecutive empires – Christian an Islamic. ITU has continued to develop in parallel with the city. Today, ITU provides education for approximately 21,000 students in one of the five city campuses Taşkışla, Gümüşsuyu, Maçka, Tuzla and Ayazağa located throughout Istanbul. All campuses are connected by the metro line which will be completed at the end of 2008. The main campus is located within an area of 256 hectares in the business area of the city.

ITU is known for educating highly skilled Engineers in a contemporary fashion. Delivering the undergraduate engineering degree at the end of 4 years, ITU provides the master degree in two year programmers and doctoral degrees at the end of at least 3 years. 21 Engineering programs have been given Substantial Equivalency by ABET. ITU is a bilingual university. Courses are offered both in Turkish and English. Since 1997, undergraduate students must complete minimum 30 % of their curriculum credits in English.

ITU actively upholds a strong commitment to expand relationships with select institutions abroad and promotes the international Exchange of students and scholars. With more than 130 international partnership agreements, the highest number of outgoing Erasmus Exchange students, ITU also considers itself and international university which is a member of EAIE, BSUN, CESAER, OECD, EUA, IAU, CMU, TIME, IAMU, ATHENS and ITU also conducts International Dual Degree Programs with some state universities in the USA and is the first Turkish university to introduce the ECTS (European Credit Transfer System). IAESTE center of Turkey is located at ITU main campus and the ERASMUS office and student club works very actively.

With its 1800 PhD Students, more than 340 labs, ITU considers itself a research focused university. With two former Presidents of The Republic and many ministers as graduates, ITU holds a strong and active bond with its alumni.

For more information: Defne KORUR Director, International Office Istanbul Technical University Office of the Rector Ayazaga Campus 34469 Maslak, Istanbul Turkey Tel/Fax +90 212 2853074 E-mail: defne.korur@itu.edu.tr

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# Katholieke Universiteit Leuven (K.U.Leuven)
# Faculty of Engineering

**History**
The K.U.Leuven dates back to 1425, but its Faculty of Engineering is of course much younger. From 1864 on, a Special Engineering School was established within the Faculty of Sciences. In 1961, it became an independent Faculty.
The bilingual university was split into two parts in 1968. The Dutch speaking part stayed in Leuven. The French speaking part moved to the new U.C.L. (Université Catholique de Louvain), 30 kilometres away. Both sister universities have prospered and expanded.
The K.U.Leuven Faculty of Engineering now is a knowledge centre in the 'Humbolt' University tradition : the teaching is based on research, or : those who produce knowledge also teach it. The Faculty roughly counts 180 professors, 30 post-docs and 500 research students. Together they teach to about 2500 students.
The Flemish Interuniversity Micro-Electronics Centre (IMEC) is situated on the same campus, as is the Innovation and Incubation Centre from which more than 20 spin-off companies have been launched.

**Teaching**
The Faculty offers (Dutch spoken) Master courses in the following fields: Architecture, Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Materials Engineering, Mechanical Engineering and Mining Engineering.
The Faculty offers a number of complementary courses and advanced postgraduate Master degrees.
Engineering and technology evolve rapidly. The Faculty therefore initiates and co-operates in many continuing education projects with other universities and with professional societies, also in an international context.

**International Dimension**
The Faculty has definitely gone international. The Faculty of Engineering at the K.U.Leuven is one of the founding members of CESAER, the Conference of European Schools for Advanced Engineering Education and Research.
The Faculty is involved in joint projects with research centres and private companies world-wide. Research is funded by regional, national and European authorities and by private companies in Belgium and abroad. The Faculty participates in all important European research programmes. It participates in many programmes for student and staff mobility both within Europe (Socrates) and with North American universities. It welcomes Ph.D. students from developing countries through K.U.Leuven and/or VLIR/ABOS projects and scholarships.

**Student Life**
The K.U.Leuven students are represented in most of the university and Faculty advisory boards. Student associations are well-organised and very active. The old streets of Leuven are an ideal setting for a bustling student life. All year round, the K.U.Leuven and the city of Leuven organise many scientific, cultural and popular events. The geographical situation of Leuven, in the heart of Europe, facilitates the connection with Paris, London, Delft, Aachen, … By train, these cities are only a couple of hours away.

**For More Information :**
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# Norwegian University of Science and Technology
# (Norges Teknisk- Naturvitenskaplige Universitet, NTNU)

**Introduction**
Whether in the oil industry, search engines, or jazz - new standards are being set by the Norwegian University of Science and Technology (NTNU).
NTNU in Trondheim represents academic eminence in technology and the natural sciences as well as in other academic disciplines ranging from the social sciences, the arts, medicine, architecture to fine art.
Cross-disciplinary cooperation results in innovative breakthroughs and creative solutions with far-reaching social and economic impact.
NTNU cooperates with selected partner countries in accordance with stipulated national priorities in Norway. Cooperation in research and education is established with about 200 universities all over the world. Our prioritized geographical areas are the EU, the USA, Japan and China. NTNU has proved to be an attractive partner either alone or together with our on-campus neighbour, SINTEF, which is Scandinavia's largest independent research institute.

**Location : NTNU is located in Trondheim, Norway's third largest city.**

**Number of Students :** 20 000. NTNU is Norway's second largest university.

**International students: 1500**

**Study Areas : Engineering /Architecture/ Social Science/ Humanities/Natural Science/ Medicine**
**NTNU's six strategic areas**

- **Energy and Petroleum – Resources and Environment**
- **Medical Technology**
- **Materials Technology**
- **Marine and Maritime Technology**
- **Information and Communication Technology**
- **Globalization**

**Exchange Programmes :** NTNU participates in exchanges through the ERASMUS programme an different national and international cooperation schemes. ECTS is introduced at all faculties. NTNU is a member of the SANTANDER Group and the TIME network.

**For More Information:** Information for exchange students can be found under the following WEB address : http://www.ntnu.no/international/exchange

For further details please contact the Office of International Relations:
NTNU – Office of International Relations - Høgskoleringen 1 - N-7049 Trondheim
Fax : +47 73595210 - Tel : +47 73595700 - Email: international@adm.ntnu .no

# Politecnico di Milano (POLIMI)

The Politecnico di Milano, established in 1863, is the largest institution in Italy for Engineering, Architecture and Industrial Design, with more than 40,000 students enrolled in its various study programmes (of which about 800 PhD students) and a faculty of about 1,200 professors and researchers and about 1,300 contract professors. It is a public university teaching technology and it has an outstanding tradition and a strong committment to innovation.

Its eminent professors over the years have included Giulio Natta (Nobel Prize in Chemistry in 1963 for having invented the polypropylene) Giuseppe Colombo (author in the early '900 of the fundamental Engineer's Handbook and developer of Italy's Edison Company), Gino Cassinis and Ercole Bottani (founders of the first European centre for electronic computation) and architects Giò Ponti and Marco Zanuso. Its graduates include Giovanni Battista Pirelli (the founder of the rubber manufacturing company), Enrico Forlanini (inventor of helicopter and hydroplane) prominent architects and designers such as Renzo Piano and Achille Castiglioni and the writer Carlo Emilio Gadda.

The Politecnico di Milano is structured in a network of Schools (Facoltà) spread over the Lombardy region with a central administration and management. The Schools are housed in seven Campuses, two of which located in Milano (Leonardo Campus and Bovisa Campus) and the others in Como, Lecco, Mantova, Cremona and Piacenza.

The educational policy mainly consists in offering different curricula tailored to local needs and to the industrial environment while integrated in a coordinated educational system, which enables student mobility within the network. The Politecnico di Milano, historically involved in a wide network of research and education activities in collaboration with the most important international universities, has reinforced in the last years an intense internationalization program for education, with the objective of increasing the number of excellent foreign students in Italy.

The Politecnico di Milano is now completely in the Bologna Process with the 3+2-year system and it offers 31 different Bachelor (Laurea), 32 Master of Science (Laurea Magistrale) including 11 programmes completely taught in English and 30 Doctor of Philosophy programmes. As far as research is concerned, state-of-the-art laboratories are located in the 16 Departments, with extensive on-site facilities.
In addition to these programs, Politecnico di Milano offers a choice of Specializing Masters, lasting for one year, that can be entered either after the B.Sc. or the M.Sc. (for instance the MBA - Master of Business Administration and the ICT - Master on Information and Communication Technology).

**For More Information :** www.polimi.it **or contact:**
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# Delft University of Technology (TU Delft)

**Tradition:** Delft University of Technology is the largest Engineering institution in the Netherlands. It was founded in 1842. The University has a tradition of providing high level education and research and has excellent experimental facilities.
With approximately13,000 students in 15 bachelor programmes and 29 master programmes, TU Delft is the largest and most comprehensive university of engineering sciences in The Netherlands. All master programmes are in the English language.

**Introduction:** Given the effects of significant growth in the world population in the coming decades and the ongoing quest for greater economic prosperity worldwide, major technological breakthroughs will be essential in order to satisfy people's basic needs. These global trends will have a profound impact on the societal mission and the long-term position of TU Delft in the coming years – all within a context of the further rigorous internationalisation of political, economic and academic networks.

**Mission :** With its unique technological infrastructure, broad knowledge base, worldwide reputation and successful alumni, TU Delft is contributing significantly to the development of responsible solutions to urgent societal problems in the Netherlands and the rest of the world.

**Vision :** TU Delft intends to fulfil its mission by developing new, ground-breaking insights that will pave the way for the urgently needed technological breakthroughs (knowledge as a product). A key part of this vision is to realise world-level multidisciplinary research and design with a view to sustainability. The faculties and unique large-scale technological research facilities at TU Delft will play a key role in realising this vision. TU Delft disseminates its knowledge by training highly qualified knowledge workers and by stimulating the application of research results (knowledge as capital). Its programmes are internationally attractive. One of the driving aims behind the vision is to attract and utilise a variegated pool of talent. Education and research, both important prerequisites for knowledge valorisation, are interwoven and harmonised.

**Strategy :** To realise its vision and mission TU Delft intends to achieve the following objectives by 2010 by means of selective (inter)national partnerships, continuous quality improvements and a stronger profile.

**Students:** Student organisations play an important role at the University. Each programme has its own student organisation that deals with excursions, job placements and extracurricular activities. There are a number of different fraternity-organisations located in the historic centre of Delft, some of them have been there for more then a century.

**More Information:**
Website: www.tudelft.nl
International Office - Delft University of Technology
PO Box 5, NL-2600 AA Delft- The Netherlands
Visiting Address: Jaffalaan 9a, 2628 BX Delft, The Netherlands
Phone : 31-15-27 88 012 - fax 31-15-27 85690
email: internationaloffice@tudelft.nl
www.tudelft.nl/exchange

# The Technische Universität München (TUM)

A Synonym for Technical Progress

**"... to teach the exact sciences and their applications in all branches of higher technology … [and] … to pass on the vital spark of science to the industrial world."**
Carl Max von Bauernfeind, Director of the Royal Polytechnic School of Munich in the inaugural lecture on December 19, 1868

The TUM can trace its actual origins to the independent 'Royal Polytechnic School' founded by King Ludwig II in 1868. In the years since its foundation, during which time Bavaria underwent far-reaching structural changes from agriculture to technology, the TUM has made noted contributions to engineering and science.

The TUM has produced a large number of leading scientists and engineers. The liquefaction of air by Carl von Linde (1895), the invention of the diesel engine by his student Rudolf Diesel (1897), the discovery of the structure of hemoglobin by Hans Fischer (1930 Nobel Prize for Chemistry), the discovery of recoil-free gamma-ray resonance absorption by Rudolf Mößbauer (1961 Nobel Prize for Physics), and the establishment of organometallic chemistry as a field of science by Ernst Otto Fischer (1973 Nobel Prize for Chemistry) stand for a large number of pioneering inventions and discoveries made at the TUM.

**Munich, Garching, Weihenstephan - The TUM Campuses**

Today the TUM is divided into 12 faculties with 480 professors (of which 250 are chair holders at the university and in the teaching clinics) 9.500 employees and approximately 22.000 students. The core university areas, namely the Faculties of Architecture; Civil Engineering and Surveying; Electrical Engineering and Information Technology; Economic and Social Sciences; Medicine; and Sports Science, are all situated at the Main Campus in Munich, the location of the University Management and central administration offices. Freising, a town 30 kilometers north-east of Munich, is the location of the Weihenstephan Campus and the Center of Life and Food Sciences, which in turn is home to seven research departments (Basic Biosciences; Plant Sciences; Animal Sciences; Ecology; Ecosystem and Landscape Management; Food and Nutrition; Biogenic Products and Technology of Land Use) and six teaching departments (Bio Sciences; Agricultural and Horticultural Sciences; Forestry Science and Resource Management; Landscape Architecture and Landscape Planning; Nutritional Science and Ecotrophology, and Brewing and Food Technology). The TUM also operates a research campus in Garching, a town on the north-east outskirts of Munich, some 15 kilometres away from the main campus. The Faculty of Physics, the Faculty of Chemistry and the Faculty of Mechanical Engineering have settled down in Garching around the university's research reactor (FRM I). The Faculty of Mathematics and the Faculty of Informatics are located at Garching. A new research neutron source, known as FRM II, was completed at the campus in 2001.

In order to open TUM for more international students, various TUM faculties have introduced English taught bachelor's and master's courses, whereby one example concerns the Master's Program in Industrial Chemistry offered by Singapore's German Institute of Science and Technology, which is run by a TUM subsidiary.

For more Information: http://www.tum.de

# Technische Universität Wien (TU Wien)
## Vienna University of Technology

The Technical University of Vienna (TUV) was established in 1815 as k.k. Polytechnic Institute and received its university status in 1975.
It has always been a concern of the TUV to position itself amongst the top-ranking universities both on national and international level by means of the most up to date curricula and practice oriented teaching and research.
Teaching at the TUV is characterised particularly by imparting a broad fundamental knowledge combined with the option of acquiring specialist knowledge in different fields.
The TUV puts very much emphasis on the linkage between theory and practice, which manifests itself by continuous participation of students in research programmes.

**TUW at a glance:**

**Faculties:** Architecture and Planning
Civil Engineering
Mechanical and Industrial Engineering
Electrical Engineering and Information Technology
Informatics
Technical Chemistry
Mathemathics and Geoinformation
Physics

**Fields of Study:**
**Bachelor-Studies and Master Studies** (3 + 2 years):
21 Bachelor Programs, 42 Master Programs in Science and Engineering
**Doctoral Studies** (3 years)

**Students:** 19.454 (21% foreigners)
**Graduates** (per year): 1.788
**Teachers/Researchers** (full time): 1.575
**Departments/Institutes**: 63
**Location:** Central Vienna, 1040, Karlsplatz 13
**Home Page**: www.tuwien.ac.at/

# Université Catholique de Louvain (UCL)

## The "Université Catholique de Louvain", Louvain-la-Neuve, and its Faculty of Engineering

In 1425 a university was founded in Louvain by decree of Pope Martinus V. In a short period of time Louvain became one of the largest and most renowned European universities. Its fame reached a first climax in the 16th century when one of the university professors in theology, Adrian of Utrecht, was elected Pope; when Erasmus lectured at the university and founded the Collegium trilingue, the first institute to teach Hebrew along with Latin and Greek; and when eminent humanist scholars, such as Juan Vives and Justus Lipsius, the cartographer, Mercator, and the anatomist, Vesalius, did research under the auspices of the University.

In 1968, the University was separated into two universities : the French-speaking "Université Catholique de Louvain" and the Dutch-speaking "Katholieke Universiteit Leuven". During the years 1972-1978, the Université Catholique de Louvain moved from the old town of Louvain (Leuven) to be re-established in the new town of Louvain-la-Neuve at 30 km at the south-east of Brussels.

Louvain-la-Neuve is a unique example of a new town built in the 20th century. It is largely pedestrian, designed with the objective of recreating the atmosphere of the ancient medievial towns, where the interactions between people are favoured by reduced distances from home to work or to school.
The U.C.L. is now organised into 10 faculties and has an enrollment of about 21 000 students, 4 200 of which are foreign students representing all 5 continents. The Faculty of Engineering has 1 700 students.

**Engineering Degree**
The basic engineering curriculum at the Faculty of Engineering consists of a five year programme of study**,** each year being subdivided in two semesters. Examinations are organized on a semester basis. The programme leads to the degree of "Ingénieur civil", a title which is recognized and protected by Belgian law. The degree is usually considered to be equivalent to the degree of Master of Science and Engineering. These studies are only accessible to applicants who successfully pass an entrance examination.
The first two years of the programme are devoted mainly to a basic scientific training mainly including Mathematics, Physics, Chemistry, Computer Science, Drawing, Projects and Humanities. These two years are called "candidatures"; successful completion of the final examinations leads to the diploma of "Candidat Ingénieur Civil".

The two year programme of basic scientific courses is followed by an additional three years of engineering studies called the "engineering years". When starting the engineering years, all students must select a field of specialization. Available programmes include Civil Engineering ; Mechanical Engineering ; Architectural Engineering ; Electrical Engineering ; Materials Engineering ; Processes Engineering ; Electromechanical Engineering ; Mathematical Engineering and Informatics. In most of these main fields, several sub-options are available.

**For More Information :**
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HTTP://WWW.fsa.ucl.AC.BE

# Universidad Politécnica de Madrid (UPM)

Universidad Politécnica de Madrid, UPM, is the technical University of Madrid, and the largest technical University in Spain. It has 21 different higher education Engineering Schools scattered in six different campuses, offering both undergraduate programmes of either 3, 5 or 6 years, and PhD programmes in most engineering fields being taught in the country.
UPM has around 45.000 students, 3 500 faculty members, and an annual budget of some 209 million Euros.

The University offers programmes in Architecture, Forestry and Computer Science, as well as in the following engineering fields (in alphabetical order): Aeronautics, Agronomy, Civil Engineering, Environment Sciences, Industry, Geodesy and Cartography, Naval Architecture, Science Materials, and Telecommunications. In addition, PhD. programmes are offered in all of the above mentioned fields.
International co-operation is one of the main goals of UPM; therefore the University participates in numerous international collaboration schemes both within and outside the European Union, such as SOCRATES (ERASMUS, LEONARDO, LINGUA.) TEMPUS, ESPRIT, ALFA, INTERCAMPUS, VULCANUS, and others.
UPM has also signed a good number of bilateral educational exchange agreements with similar universities in Europe, USA, Japan South America and Australia. Some of these agreements include double degree programmes, where participating students can obtain both universities' degrees.
Universidad Politécnica de Madrid is also an active member in many international associations such as CESAER, SEFI, EAIE, BEST, CRE, IAU, IEEE, and others.

**For More Information :** www.upm.es **or contact:**
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# Warsaw University of Technology (WUT), Poland

The University was established in 1826 as the Preparatory School for the Institute of Technology. WUT is a public state school with full academic autonomy, supervised by the Ministry of Science and Higher Education. In 2007 the university employed 4,589 people, of whom 2,398 (around 52%) are academic staff.

WUT is one of the largest and ranked number **"ONE"** among all 18 technical universities in Poland. In the academic year 2007/08, 30 995 students were registered at three-level studies – BSc. MSc., and PhD.

There are also two other colleges, which widen a range of academic non-technical teaching: International Business School and College of Economics and Social Sciences.

There is also a variety of the research projects, which are undertaken at WUT. In 2007 WUT's scientists won more than 210 research grants from the Ministry of Science and Higher Education. A total number of research projects funded by the Ministry of Science and Higher Education realized by WUT was 641.

This university also has an excellent success rate in winning about 90 different grants from the European Union's 6$^{th}$ Framework Programme (FP). Currently WUT is running 7$^{th}$ Framework Programme with 17 contracted projects.

Warsaw University of Technology places the great stress on international cooperation in the fields of scientific research, technology, education and culture. In 2007 there were 186 agreements on bilateral cooperation and 543 joint international undertakings with universities and scientific institutions from all over the world.

Warsaw University of Technology is the most important scientific centre of engineering in Poland with well internationally recognized prestige. According to the ranking of the 500 largest enterprises in Poland, **51%** of their CEO's and Presidents are graduated from universities of technology. More than **20%** of them are graduates of the Warsaw University of Technology!

**For More Information: http://www.cwm.pw.edu.pl** or **http://www.pw.edu.pl**

# AGROPARISTECH (AGROPT/ ENGREF)

AgroParisTech is a public institute of higher education and research (under the management of the French Ministry of Agriculture and Fishing) and it is ranked among France's top ten institution of higher education. Three Graduate Institutes in Science and Engineering : INA P-G (Institut National Agronomique Paris-Grignon), ENSIA (Ecole Nationale Supérieure des Industries Agricoles et Alimentaires) and ENGREF (Ecole Nationale du Génie Rural, des Eaux et Forêts), joined forces and founded AgroParisTech in January 1st 2007.

AgroParisTech is a partr of the Paris Institute of Technology which is a consortium of 10 of the foremost French Graduate Institutes in Science and Engineering (www.paristech.org).

AgroParisTech is also part of the Life and Environment Science and Technology Hub of the Paris region, together with INRA, Cemagref, AFSSA, the Alfort National Veterinary School and the Versailles national School of Landscape architecture.

AgroParisTech is organized into 5 departments for education and research with a permanent staff of 220 teachers-researchers and 290 researchers working in 38 research Laboratories : 1) Agronomy, Forestry, Water and Environmental Science and Technology ; 2) Life Science and Health ; 3) Food and Bioproduct Science and Engineering ; 4) Economic, Social, and Management Science ; as well as 5) Modeling: Mathematics, Informatics and Physics.

The resources on 9 campuses (4 in Paris and the greater Paris area) have been brought together to serve 2,000 students including 500 Ph.D. students.

The academic program offers among others a master's in engineering and science of agronomy.

**For More Information : http ://www/agroparistech.fr**

# L'Ecole des Ponts ParisTech (ENPC)

The corps of Engineers of Ponts et Chaussées (Bridges and Roads) was created in 1716. In 1747 the Royal Council issued a decree setting up a specific training programme for State Engineers which was entrusted to Jean-Rodolphe Perronet. In 1997, the Ecole des Ponts celebrated its 250th anniversary.

During the XVIIIth century, teaching was carried out by the most outstanding students in the Institute who took their fellow students in hand and passed on to them their knowledge and skills. After the French Revolution, the Institute built up a teaching faculty and adapted its curriculum and teaching methods to the latest developments in science and technology. Its doors were open to new categories of students, including non-civil servants and foreigners. Among its graduates from this period are famous scholars and engineers such as Cauchy and Navier and later Fresnel, Becquerel and Bienvenue; all of them helped contribute to the remarkable advances made in France during this period in transport and infrastructure networks.

During the 1980's and 90's changes in the curriculum have given students more choices : in addition to the traditional courses in Civil Engineering, Urban Planning and Regional Development, students also have the possibility of choosing options in related fields such as Industrial Engineering, Computer Science Environmental Studies, and Economics**.** Students also do a wide range of practical training periods in government and industry, which provide them with professional experience and open the path to a wide variety of careers : graduates from the Ecole des Ponts can be found in all major areas of the economic sector : Construction and Building, Urban Planning, Scientific Research, Production and Management, Finance and Banking.

The Ecole des Ponts ParisTech has 9 research laboratories, 7 «Mastere » degrees, 5 doctoral schools within Paris Est University which awards 40 Ph.D degrees to Ecole des Ponts PhD students each year. The Ecole des Ponts has extensive relations with foreign universities and institutes, including joint degree programmes with several European higher educational establishments. During Academic year 2007-2008, there were 483 foreign students studying at Ecole des Ponts, representing some 60 countries.

**For more Information :http://www.enpc.fr**

# L'Ecole Nationale Supérieure d'Arts et Métiers (ENSAM – Arts et Métiers ParisTech)

Arts et Métiers ParisTech was founded in 1780 by the Duke de la Rochefoucauld-Liancourt.
It is a public higher education institution specialized in Mechanical and Industrial Engineering which has graduated more than 78 000 engineers since the foundation.

**A Multi-Site National Institution including:**
- 8 Graduate and Research Campuses **in Aix-en-Provence, Angers, Bordeaux, Châlons-en-Champagne, Cluny, Lille, Metz, Paris.**
- 3 Postmaster Institutes **in Bastia, Chalon-sur-Saône, Chambéry.**

**3 Major Fields of Study:**
- Mechanics, Biomechanics, Materials, Manufacturing Processes,
- Fluid Mechanics, Energy Systems,
- Design, Industrialization, Risk, Decision Making.

**Graduate Degrees Awarded:**
- **OUR LEADING PROGRAM: diplôme d'ingénieur (Engineering Degree) - 1000 graduates each year and Double Degree Programmes** with German, Spanish, Portuguese, Romanian, Polish, Czech, Hungarian partner universities,
- 21 specialties of Master of Research (preparatory year to PhD - admission),
- PhD.

# Ecole Nationale Supérieure de Chimie de Paris (ENSCP)

Located in the heart of Paris, ENSCP was founded in 1896 by Charles FRIEDEL and Henri MOISSAN (Nobel Prize for Chemistry in 1906) and is one of the leading French "Grande Ecole" in Chemistry and Chemical Engineering. It is also a renowned research centre where basic and applied research cover the following areas:
- Organic Synthesis and Biotechnology
- Energetics and Chemical Engineering
- Stucture and Properties of Matter, Material Sciences

**The Engineering Programmes of Study are Multidisciplinary and Organized in Six Departments :**
- Structure and Properties of Matter
- Energetics, Transformation of Matter and Chemical Engineering
- Organic and Bio-Organic Chemistry and Polymers
- Mathematics and Computer Sciences
- Management, and Communication
- Languages and Cultures

Students at ENSCP receive their degree after five years of studies, following the French secondary school "Baccalauréat". During the 3$^{rd}$ and the 4$^{th}$ year of higher education, 30 % of the studies consist in laboratory exercises. In the final year, the students undertake a personal research project in public or private laboratories. 50% of the students do this thesis in foreign laboratories, mainly in Europe, the USA, Canada, Asia, South America…

The ENSCP Engineering degree gives the same rights as those conferred by an international Master. More than one third of the ENSCP engineer-graduates pursue PhD studies.
ENSCP has a total of 300 students and a research and administrative staff of 300, of which, 90 are Ph.D students.
**For More Information : http://www.enscp.fr/**

# Ecole Nationale Supérieure de Techniques Avancées (ENSTA)

One of the leading French 'Grandes Ecoles', ENSTA - (National Engineering Institute for Advanced Technologies) trains highly qualified engineers with a global knowledge. Their background enables them to design, build and manage complex industrial systems.

The Institute's specific profile lies in high technology. ENSTA graduates work in a vast array of branches, ranging from the Automobile Industry to Petroleum, Information Technology and Electronics ; Engineering ; Transport ; Shipbuilding and even Financial Services. Their functions range from R&D to Industrial Production and Management engineers. Many of them evolve in the course of their career from technical tasks to high-level management functions.

About 160 students graduate every year. The engineering programme lasts for 3 years. It combines a broad scientific core, specialized technical areas and general courses (such as Communication, Economics, Finance, Law and two foreign languages) as well as a part-time research project and various internships with companies.

Teaching is done by researchers from ENSTA's five Research Laboratories (Mechanics, Electronics and Computer Science, Chemical Engineering, Optics and Physics, Applied Mathematics) as well as by some
1 000 engineers from industry.
**For More Information :** www.ensta.fr

# Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (ESPCI ParisTech)

ESPCI ParisTech (http://www.espci.fr) is a leading "Grande Ecole" in France training scientists and engineers at the graduate level, as well as a world-renowned research institution with a distinguished history that counts among its current and former faculty Pierre & Marie Curie, Pierre-Gilles de Gennes and other Nobel laureates. ESPCI ParisTech was founded in 1882, and is under the leadership of the City of Paris.

The campus, at the heart of "Quartier Latin" in central Paris, hosts 18 laboratories with over 250 researchers (including 40 foreign scientists) conducting both fundamental and applied research in physics, chemistry and biology. ESPCI ParisTech maintains strong ties with both local and global companies through collaborative research and internships. Each year, scientists at ESPCI ParisTech publish over 350 articles, file 50 patents and oversee 150 PhD students.

From an education perspective, ESPCI ParisTech trains engineers highly skilled at the bench and with an exceptional ability to perform research across disciplines within physics and chemistry, completed by some key knowledge of biology, mathematics, computer science and foreign languages. During the first three years of the curriculum, students spend 15 hours a week in research labs on campus, on top of a six-month internship in industry performed at the beginning of the third year. The fourth year is entirely devoted to research at the MSc. level. This curriculum is also original amongst French institutions for including personalized tutorials for each course, where small groups of four students receive guidance and advice from an expert in the field. Indeed, at ESPCI ParisTech, the outstanding faculty-to-student ratio (as high as 60 professors for 72 students per class) warrants excellence at all levels of the curriculum.

For more information, please contact: Sylvain Gilat, PhD – Head of the Communications & Global Advancement Department, ESPCI ParisTech - sylvain.gilat@espci.fr

# Mines ParisTech (MP)

*formerly: Ecole Nationale Supérieure des Mines de Paris (ENSMP)*

Founded in 1783 by the King Louis XVI, and located since 1816 in the Latin Quarter in Paris, Mines ParisTech was originally charged with the training of mining engineers and the Corps of Mines. Decade after decade, this institution developed its education and research in numerous fields of science and engineering. Today, this 'Grande Ecole' prepares its students to be the next decision makers in all fields of engineering and management.
The institution has recently be renamed 'Mines ParisTech' to reflect its commitment within ParisTech.

**Several programmes of study are proposed to students:**
**-The Master Degree in Science and Executive Engineering (2 years of study):** the flagship degree, encompassing sciences, engineering, social sciences and management, 140 degrees / year.
- Master programmes: 1.5 to 2 years of training devoted to one field of engineering, 100 degrees / year.
**Other Post-Master Specialized Programmes (non-doctoral):**
-The Post-Master Professional Certificates programmes: 12 months of professionally-oriented study offered to students who have completed their master degree, 275 degrees / year
- The "Ingénieurs du Corps des Mines" Special Programme
**The Doctoral programmes:**
- Three years in an EMP research centre (120 degrees / year). Admission with a master degree or equivalent.

**Mines ParisTech has 16 research centres working in 5 main areas:**
- Applied Mathematics, Computer Science, Robotics, Systems and Control
- Process Engineering and Energetics
- Materials Science and Engineering
- Social and Economic Sciences.
- Earth and Environmental Sciences

**For More Information: http://www.mines-paristech.fr/ or http://www.ensmp.fr**

# TELECOM ParisTech (TPT)

TELECOM ParisTech was created in 1878 as the Ecole Supérieure de Télégraphie; in 1934 , the Institute received its current offical name, the Ecole Nationale Supérieure des Télécommunications. Today, TELECOM ParisTech is recognized as the leading Grande Ecole in the area of the Sciences and Technologies of Telecommunications and their Management. Digital and Optical Communications ; Electronics ; Computer Science ; Networks ; Signals and Systems ; Image Processing...are among the TELECOM ParisTech research and teaching domains.
**Four programmes of study are proposed to students :**
**-The Engineering Degree Programme :** 5 years of study following the French secondary school "Baccalauréat" (concerns 710 students).
**-The Master of Science Programmes :** 15 months of study (English and/or French). 7 different programmes in ICT fields are offered to students holding a Bachelors Degree (concerns 110 students).
**-The professional « Mastères Spécialisés » Programmes :** 12 months of study in Telecommunications related areas offered to students who have completed their fifth year of higher education (concerns 210 students).
**-The Doctoral Programme :** 3 years of research in a state of the art Telecommunications domaine (250 students).
TELECOM ParisTech is also associated with 8 Research Master Programmes, one-year predoctoral studies, (concerns about 360 students of which 10% come from the TELECOM ParisTech).
The Institute is administered by a Director, assisted by a team of advisors.
**Four Scientific Departments and a Department of Languages and Cultures assure the teaching and research activities.** Total scientific staff numbers : 150 with, in addition , an administrative staff of 170.
For years TELECOM ParisTech has followed a policy promoting international relations :
Today, 30% of the TELECOM ParisTech students following one of the four degree programmes, come from another country. In addition, each year over 170 foreign students spend 3-12 months doing research in TELECOM ParisTech laboratories and some 10 professors from around the world carry out sabbatical periods with TELECOM ParisTech departments.
**For More Information :**
**http://www.telecom-paristech.fr**