

# Space Exploration and Development Systems

**VI Edition 2011/2012**



**POLITECNICO  
DI TORINO**

I Facoltà di Ingegneria

Gestito da:



The International Post Graduate Master Course (Italian: *Master Universitario di II livello*) in “**Space Exploration and Development Systems**” (6<sup>th</sup> edition 2011-2012) has been established by the First School of Engineering of Politecnico di Torino (Italy), ISAE (Formation Supaero) Toulouse (France) and managed by COREP.

COREP – Consortium for the Research and Permanent Education – is a no-profit consortium created in 1987 on the initiative of the three Piedmont Universities – Polytechnic of Turin, University of Eastern Piedmont “A. Avogadro” – local bodies and important Italian industries and associations. One of the main goals of COREP is to provide high qualifying training services to young graduates in order to facilitate their entrance in the labour market, promoting the cooperation between universities and socio-economic actors. As a guaranty of reliability and professionalism, some COREP's branches are certified for education and training activities by Regione Piemonte.

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- Thales Alenia Space Italia
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- ASTRIUM Toulouse
- ALTEC Torino
- Thales Alenia Space France
- ASI – Agenzia Spaziale Italiana
- CNES - Centre National d'Etudes Spatiales

**In partnership with:**



**Director:**

Prof. Gianfranco Chiocchia, Department of Aerospace Engineering, Politecnico di Torino

**Educational Project Manager:**

Prof. Ernesto Vallerani, Former President of Alenia Spazio and Former Vice Chairman of the International Academy of Astronautics (IAA)

**Chief Project Work Tutor:**

Mr. Enrico Beruto, former System Engineer Manager, Alcatel Alenia Space

**COREP Organizational Coordinator of the Master:**

Mrs. Elena Roggieri

**COREP Organizational Supervisor**

Mrs Chiara Cerato

**COREP Secretariat Office**

C.so Trento, 13 - 10129 Turin - Italy

**Tel** + 39 011 197.42.401 - **Fax** +39 011 197.42.419

**E-mail:** [formazione@corep.it](mailto:formazione@corep.it)

**Web:** [www.formazione.corep.it](http://www.formazione.corep.it)

***The postgraduate Master Course is established by the First School of Engineering of the Politecnico di Torino***

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## **1. WHY THIS MASTER?**

SEEDS is an International Post Graduate Master Course in Space Exploration and Development Systems (*Italian: "Master Universitario di II livello"*), at its 6<sup>th</sup> edition, established by the First School of Engineering of Politecnico di Torino (Italy), ISAE (Formation Supaero) Toulouse (France) and managed by COREP.

Thanks to its innovative programme, SEEDS aims to meet the request emerging from the European Space Industry of a new generation of high level specialists, whose main characteristics are to be educated in an international environment and to have gathered an experience in working on advanced projects in some of the most renowned Space Centres, Agencies and Companies of the European Union.

To fulfil these objectives, SEEDS originated in 2005 from the collaboration of three European universities, namely an Italian (Politecnico di Torino), a French one (Supaero Toulouse, now ISAE) and a German one (Bremen Universität), all located in towns whose common feature is that of hosting industries and research centres linked to one another by a long-standing tradition of co-operation in space. In a recent time this structure has been simplified and now SEEDS is run in Torino and Toulouse.

The main object of SEEDS is the exploration of the space and the development of the related systems. It deliberately differs from the utilization of the space, which forms the object of other existing master courses (most of them on national bases). Selecting the space exploration as its principal theme, SEEDS aims to harness the most recent development lines emerging in the space strategies of both the European Union and the USA and, according to these strategies, to prepare the specialists who will be required in this challenging domain.

## **2. JOB OPPORTUNITIES**

SEEDS looks at the major European Space Agencies and Companies involved in Exploration projects, such as the European Space Agency (ESA), the Italian (ASI), the French (CNES) and the other national Agencies, the main European companies active in the space sector (like Thales Alenia Space which supports SEEDS) and other establishments. These organizations are strongly interested to the Master initiative since its main focus lies on the training of engineering resources oriented to the specific Exploration system products, prepared to work in an international context and trained on the job by using modern and company oriented engineering methodologies.

It is expected that the students successfully completing the SEEDS courses and associated Project Works will be employed by the partner organizations at the proper level in their Engineering Teams working on the Space Exploration projects. The employment rates of the graduates from the five SEEDS editions confirm these expectations: 50 out of 54 graduates from the 2005/06 edition to the 2009/2010 are presently working on space activities in Europe.

## **3. ADMISSION REQUIREMENTS**

A **Bac+5 level degree** (e.g. French Diplôme d'Ingénieur, Italian Laurea Magistrale or former 5-year Laurea, German Diplom or equivalent degree at MSc level) in Industrial Engineering (Aerospace, Mechanical, Thermal, Nuclear, Electronics ...), in Information and Communications Technologies or in Physical Sciences is required. BSc or MEng degrees at a minimum level of Bac+4 may also be considered for admission.

A good knowledge of English is required to the participant.

A maximum number of **15 participants is foreseen in Torino**.

**N. 5 places** will be reserved to applicable candidates who are citizens of the following countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Luxemburg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Hungary, Romania, Poland and Canada. If not used, these places can be attributed to candidates from other countries.

## **Selection**

A Selection Board, made up of the Director, the COREP Organizational Coordinator and a few representatives of the Academia or the Space Industry, will examine all submitted application forms and curricula and reject those not complying to the general requests to be enrolled in the SEEDS Master Course. The selection is based on the curricula of the applicants and oral interviews in English.

During this interview, knowledge about Informatics (Internet, E-mail, Windows, Word and Excel), if not certified by given exams, will be tested.

The oral interview for the participants will take place **the 30<sup>th</sup> of November 2011** (for those who apply by the 23rd of November) and the 7<sup>th</sup> of December (for those who apply by the 5<sup>th</sup> of December)

For applicants from outside Italy a videoconference or webcam interview mode can also be applied.

At the end of the selection process a ranking list of the successful applicants will be produced. These will be enrolled in the SEEDS Master Course according to the position in the list and to the number of available places.

#### **4. PERIOD/VENUE**

##### **Period**

The course will be held **from January 2012 to January 2013 and will start on January 16<sup>th</sup>**.

The course attendance is mandatory and implies full time engagement from Monday to Friday (9.00-13.00;14.00-18.00).

##### **Venue**

The first months of lectures and exercises in Torino will be held at COREP, C.so Trento 13.

The SEEDS Project Work activity will then start with an Introduction lasting two weeks, to be partly spent either at the Space Centre ALTEC or in the Thales Alenia Space premises. Then two weeks of additional lectures and exercises will follow in Toulouse, just before the start of the first Project Work phase which will finish at the end of July. Back to Torino the students will perform the second project Work phase which will end in December.

It is expected that – as in the first five editions – the final Project Work discussion will be held at the ESA ESTEC Space Centre in Noordwijk (The Netherlands) or in another European space establishment.

**Information on the Partner Universities can be found in the European SEEDS Web site: [www.seeds-master.eu](http://www.seeds-master.eu)**

#### **5. PROGRAMME**

The course working language will be English.

The 2011/2012 training programme will have an overall duration of 12 months for a total amount of 1684 hours and 67 credits.

The course attendance is mandatory and implies full time engagement from Monday to Friday (9.00-13.00;14.00-18.00).

The first 4 months (about 634 hours) will be mainly spent at Politecnico di Torino with the last two weeks at ISAE-Supaero. These will mainly consist of class lectures and exercises providing the general foundations of the various disciplines related to Space Exploration. A parallel French class is organized at ISAE Supaero through the local TAS-Astro programme (see the SEEDS European website for details). Visits to National or European facilities as well as conferences and lectures of distinguished personalities are foreseen throughout this phase. The planned average class attendance is almost 36 hours/week.

The main taught subjects may be divided in two categories:

- **Understanding Space: Introduction to Space Basic Concepts**

Space and planetary environment; Orbits and astrodynamics; Mission analysis; Space human engineering - Crew safety; Space utilization; Space System engineering I; Space programme management; RAMS; Planetary aerothermodynamics.

- **Learning about Space Systems: Fundamentals of Space Engineering**

Space System engineering II; Space robotics; Space propulsion; Attitude determination, guidance and control; Environmental control - Life support; Thermal control; Space telecommunication; Power generation; Space materials and structures; Space avionics; Space Programme Management - Costs estimation.

Learning assessments on all subjects are foreseen at the end of every lecture phase, possibly grouped to homogeneous clusters to be evaluated as a whole.

In the following 8 months (about 1050 hours) the students approach the future Project Work Activities. Then they extensively develop the SEEDS Project Work under the guide of experienced senior tutors. Thanks to its extension this Project Work is one of the main characteristic features of SEEDS. It is divided into two phases, each one dedicated to a special aspect of the space exploration. A specific theme is identified every year (past topics have been, e.g., the preliminary design of a lunar outpost or a mission to an asteroid). Each Project Work phase is dedicated to a specific aspect of the selected theme, taking also into account the locally available competences. The two phases are hosted in a temporal sequence by universities, industries and centres of the associated European towns. During the whole Project Work students from Torino and Toulouse (TAS-Astro) are grouped together and work in cross-national teams. The Project Work itself is an advanced and ambitious activity, intended to lead to scientific reports to be diffused worldwide in the space community. On more than one occasion partial results have been presented by the students to international conferences. The activities performed during the 2005, 2006, 2007, 2008 and 2009 Project Works are described in the SEEDS PW Executive Summaries 2005, 2006, 2007, 2008 and 2009 respectively (see the [European SEEDS website](#) for details).

## **6. SCIENTIFIC COMMITTEE**

The SEEDS Scientific Committee is composed by:

**Director**

Prof. Gianfranco Chiocchia, Department of Aerospace Engineering, Politecnico di Torino

**Educational Project Manager**

Prof. Ernesto Vallerani, Former President of Alenia Spazio and Former Vice Chairman of the International Academy of Astronautics (IAA)

**Chief Project Work Tutor**

Mr. Enrico Beruto, former System Engineer Manager, Alcatel Alenia Space

**Representative from ISAE Supaero, Toulouse**

Prof. Bénédicte Escudier

**Representative from Thales Alenia Space**

Mr. Piero Messidoro, BU Space Infrastructures & Transportation Director Engineering, Thales Alenia Space

## **7. HOW TO APPLY**

The new deadline to apply is: **5<sup>th</sup> of December 2011.**

**The application is unbinding.** It only aims to be admitted to the selection.

To register for the Master, please fill in all parts of the on-line form, **active until the expiry date for entries**, which can be accessed **at the bottom of this section**.

Before proceeding, please read carefully this section, which contains information relevant to the proper filling of the on-line form and the proper management of the documents to attach.

### **GUIDELINES TO FILL IN THE APPLICATION FORM**

It is highly recommended, before you begin, **to make sure to have all the information and documents** listed below (see section: Documents to attach) necessary to complete the application form (including a personal e-mail address to send any communications and a mobile phone number).

If you have all the required data, the time for filling in the form is **about 20 minutes**.

At the end of the application form, once all the data have been saved and attachments included, click on *"Go to next step"*: a preview of the form will be displayed.

It is very important **to make sure that all the information entered are correct**.

If you want to save and store on your PC the preview of the online form, please select from the File Menu of your browser *"Save As"*.

Similarly, if you want to print the document, please select from the File Menu of your browser *"Print"*.

Once **verified the correctness of the data entered**, please click on *"Complete the registration"* so that the procedure is over.

At the end of the procedure, the **confirmation of the successful submission of the form and an identification code (ID code)**, composed by the Postgraduate Course acronym followed by 5 numbers (e.g.: tunnel94361 - seeds59885 - etc ...), will be displayed.

Candidates are asked to **save, carefully store and if necessary print this identification code (ID code)** that will be associated to each user for the identification during the steps of the selection and the publication of the ranking lists.

To save on your PC and store the page with the confirmation of the successful submission of the application with the ID code, please select from the File Menu of your browser *"Save Page As"*.

The notification of the proper submission of the form and the ID code will be also sent automatically to users via SMS to the phone number stated in the online form.

**It should be noted that the procedure can be considered completed only after the display / receiving of the confirmation of successful submission of the application form and the ID code.**

In case of non-receipt of SMS and/or no display of the ID code, for information on forms submitted or problems encountered during the online registration form

**You can contact COREP staff:**

Tel. +39. 011 19742401

E-mail: [iscrizioni@corep.it](mailto:iscrizioni@corep.it)

### **DOCUMENTS TO ATTACH**

**Following documentation must be provided in attachment.**

**The required documents will be sent through the online form after scanning them** (suggested format: JPG or PDF) **and attaching the corresponding files** (maximum file size: 1 Mbyte per file).

Before filling in the online form, **you are kindly suggested to have the required documents in the electronic format** above mentioned.

In exceptional cases only, whether interested parties would not have the possibility to scan the documents, it will be possible to send them:

- by fax at the following nr.: +39 011/19742419
- directly to the COREP Secretary's Office: Corso Trento, 13 – 10129 Torino, Italia
- by mail to: Segreteria Master COREP (Corso Trento, 13 – 10129 Torino, Italia).

In all cases, it is necessary to indicate the name of the candidate, the ID Code received at the end of the application, the title of the Postgraduate Course.

Please note that the **Curriculum Vitae must be attached in electronic format.**

- **ALL STUDENTS** must enclose:

- Copy of the MSc (or MSc equivalent) degree together with the transcript of records of the sustained examinations

For final year student it is sufficient a certificate of exams with marks.

Only for students with Italian degree, the self declaration ex art. 445/2000, articles 46-47 is also accepted. **Download the model.**

However, the degree certificate must be transmitted to the secretary before the dates of selection.

- Curriculum Vitae according to the European standard **Download the model.**  
It must include the authorization to the treatment of the personal data (Italian DL 196/2003).
- Title of the MSc (or MSc equivalent) final project together with a short summary of its contents (max one page)
- Copy of a passport or identity card valid
- Copy of "Codice Fiscale" (Italian individual tax code)  
It is obtainable at the "[Agenzia delle Entrate](http://www.agenziaentrate.it)" local office (Italian Internal Revenue Service) by presenting a document of identification (foreigners must present Passport or Permit of Stay).  
Residents abroad can refer also to Italian Consulates.  
**For further information** (link a <http://www.agenziaentrate.it/ilwcm/connect/Nsi/Servizi/Codice+fiscale+-+Tessera+Sanitaria/Codice+fiscale+faq/>)
- 1 passport photo with name and surname reported on the back (photography is not mandatory for the registration, but it must be given in case of selection. If the selection takes place through videoconference, the photo will be delivered, if admitted to the master, together with the formalization of confirmation)
- Declaration of veracity and completeness of the data declared in the online form. **Download the model.**

- **STUDENTS WITH FOREIGN DEGREE** must also enclose:

- Declaration of value and certificate with the translation of all the passed exams.

This declaration must be requested to the Italian Consulate in the country where the student had the degree. For further information, please visit the following page: <http://www.study-in-italy.it/php5/study-italy.php?lang=EN&idorizz=3&idvert=27>

- **FOREIGN STUDENTS FROM COUNTRIES INDICATED IN THE VISA SYSTEM AND THE ENTRY OF ALIENS INTO ITALY AND THE SCHENGEN AREA ([www.esteri.it/visti/home.asp](http://www.esteri.it/visti/home.asp)) LIVING IN ITALY** must also request:

- Entry Visa and residence permit

Incompletes application forms won't be considered as valid.

The application form and the attachments must be received **no later than the specified deadlines.**

### **CONFIRMATION OF REGISTRATION**

According to the Selection procedure described in the section "WHO CAN ATTEND", following the publication of the ranking lists, eligible candidates will be proposed to regularize the registration through the apposite form ("Confirmation of registration").



Please consider that:

- STUDENTS WITH ITALIAN DEGREE will have to deliver an original copy of their "Tesi" Degree.
- FOREIGN STUDENTS FROM COUNTRIES INDICATED IN THE VISA SYSTEM AND THE ENTRY OF ALIENS INTO ITALY AND THE SCHENGEN AREA ([www.esteri.it/visti/home.asp](http://www.esteri.it/visti/home.asp)) must give to the Master Secretariat, within the expiration date, the Visa of entrance for study reason type D with multiple entrances and the residence permit, before confirming the registration with the form "Confirmation of registration".

Further information about documents for foreign students are available on the site:

[www.esteri.it/visti/home.asp](http://www.esteri.it/visti/home.asp)

**Personal data will be used by COREP according to Italian laws (Article n. 13 Legislative decree n. 196/03).**

For the proper display of the documents in .doc format it is recommended to use a version of Microsoft Office more recent or equal than 2003 version. Previous versions may not allow the proper display of the document (e.g.: COREP logo not in evidence), but this does not affect its validity for registration purposes.

For the .pdf format, we recommend the use of an Adobe Acrobat version more recent than 9.3. Click here to download: <http://get.adobe.com/uk/reader/>

## **8. TUITION FEE**

**In no case the tuition fee for the 6th SEEDS edition will exceed 5000,00 Euro.** This rate is intended for the whole SEEDS course and includes also the university fees. If the financial support received during the last editions (sponsorships, subsidies, EU Social Fund ...) will be confirmed also for 2011/12 the quoted amount will be reduced (in the first 5 edition the fee ranged from 3000 to 4500 Euro, depending on the obtained financial support).

**For all students who submit an application by 9<sup>th</sup> November 2011 there is a reduction of 10% on entry fee.**

It is emphasized that no fellowships are available since, according to its policy, SEEDS utilizes any additional financial income to realize a generalized fee reduction as high as possible, rather than to support individual students. As a consequence, separate fellowships have to be found by the students themselves. For instance, some Italian Regions support their citizens' attendance of post-degree courses (information can be obtained from the regional offices).

Accommodation and travel costs during the all teaching and Project Work phases are to be sustained by the students.

A maximum number of **15 participants** is foreseen in Torino.

**The Master Course will be activated on condition that there are at least 10 students and foreseen sponsorships have been confirmed.**

The Scientific Committee may decide to activate the Post Graduate Master Course with a reduced participant's number.

Furthermore all Italian students enrolled in Post-graduated Master Courses managed by COREP can get an "ad honorem loan" for an amount of 5.000 Euro per year given by UniCredit Bank. To get the loan it is sufficient to present an Enrolment Certification to the Master, without other requirements. Further information can be asked to the COREP Master Secretariat.

## **9. CERTIFICATION**

A final report ("Executive Summary") followed by a discussion in front of international experts on the Project Work concludes the course and finally leads to the award of the SEEDS "Master Universitario di II livello" degree released by Politecnico di Torino. Additionally, a SEEDS Certificate/label jointly released by Politecnico di Torino and ISAE Supaero will be attached to the National Degree.

In order to be admitted to the Project Work activities students must attend at least 2/3 of the lecture hours (certificated by signature), and to pass all related examinations. Students satisfying this requirement get the SEEDS Master Degree and Certificate after conclusion of the Project Work activities, full completion of the Executive Summary and successful final discussion.

To be entitled to obtain the University Master Degree, the Italian students must comply to the Italian requirements stated by the law on education T.U. of 1933 art. 142 (simultaneous enrolment in other universities courses, doctorates, etc...is not admitted).

Participation admitted as "uditore" (audience) does not allow acquisition of CFU (ECTS). At the end of the Course, participants who were admitted only for frequency will obtain a certificate of attendance.

## **10. PARTNER**

The SEEDS Master Course is a joint educational project of:



**POLITECNICO  
DI TORINO**



With the support or the endorsement of:



## **INFORMATION**

### **COREP Secretary's Office**

C.so Trento 13, 10129 Turin – Italy

Phone: +39 011 197 424 01

Fax: +39 011 197 424 19

E-mail: [formazione@corep.it](mailto:formazione@corep.it)

Opening hours: from Monday to Friday from 8.30 a.m.to 16.30 p.m.