STAGES FOR THE SECOND YEAR STUDENTS OF THE SCHOOL OF AEROSPACE ENGINEERING

The curriculum for students enrolled since academic year 2017/18 includes 6 credits for stages, to be collected during the second year. Students are responsible to fulfil such a mandatory activity, and the easiest way is to choose among the offer proposed by the School and listed in this catalogue.

Students must consider stages whether they are close to end their regular courses or – always during the second year – they do have spare time available from mandatory or elective courses. Students should inform the instructor responsible for stage activities, currently prof. G.Palmerini giovanni.palmerini@uniroma1.it within 26 January 2019

Students must communicate their preferences selecting:

1 position offered outside

4 positions offered by School’s Labs

Attach to the Email the Infostud screenshot of the exams given

On 31 January the Board of the School will assign to each students the stage position taking into account preferences, time availability and, in case of stage possibilities in high demand, average of the marks at the exams and marks of the exams significant for the specific activity.

The following list includes the stages offered up to the current date, partitioned in three sections according to their characteristics (activities to be performed at the School’s labs, activities in industries or research centers in Rome or vicinity, and activities far from Rome (last option would be better considered for longer periods, probably in a thesis’ perspective). For every stage there will be a tutor (the professor responsible of the lab for the in-house possibilities, a professional profile from the industry or research center for the external activities).

The stage is a self-standing activity, mandatory part of the curriculum, and it will end at the completion of a number of working hours in the order of the due amount (150) with the approval of the relevant tutor. The tutor will fill and sign a form, and the School will grant the 6 credits including them in the student’s profile on Infostud. It is possible that – upon appreciation of both parties (student and tutor) the activity could be pursued as a thesis: however, there will be a formal assignment of this dissertation work, different and separated from the award of the stage’s credits.

Section I. Stages offered at the School Labs, via Salaria 831, Rome

Positions offered up-to-date 66, still available 63

Section II. Stages offered at industries in Rome area

Positions offered up-to-date 8, still available 4

Section III. Stages offered abroad (Italy and Europe)

Positions offered up-to-date 4, still available 4
Section I. Stages offered at the School Labs, via Salaria 831, Rome

Stages are listed according to each Lab’s offer

**AEROSPOWER Lab** (prof. L. Schirone)

Positions offered up-to-date 5, still available 5

Modeling of a power distribution unit
1 position: Matlab or Simulink coding

Modeling locomotion solution for planetary rovers
1 position: Matlab or Simulink coding

Modeling Solar Panels: flexible 1-D, flexible 2-D, retractable, lightweight
  1 position: Matlab or Simulink coding

Modeling Primary Generation System for satellites, n-wheels rover, spheric rover
1 position: Matlab or Simulink coding

Modeling Energy storage system
  1 position: Matlab or Simulink coding

**Automation, Robotics and Control for Aerospace – ARCA** (prof. F. Curti)

Positions offered up-to-date 12, still available 12

Design & implementation of a slip control algorithm for a rover in a simulated lunar surface.
  1 position: Matlab coding, interest to work on experimental set up

Design & implementation of proximity maneuvers using the robot simulator MONSTER
  1 position: Matlab coding, interest to work on experimental set up

Kinematic implementation of a six degree-of-freedom robotic arm
1 position: Matlab coding, interest to work on experimental set up

Firmware design and implementation of Star Tracker software
  1 position: Matlab coding, C-coding, interest to work on experimental set up

Study, design and set-up of a celestial sphere simulator for Star Tracker testing
  2 positions: Matlab/Simulink coding, interest to work on experimental set up

Implementation of orbiting objects detection and identification algorithms for space surveillance
  1 position: Matlab coding

Experimental set-up for an attitude control subsystem
  2 positions: Matlab coding, interest to work on experimental set up

Preliminary design of attitude determination and control architecture for SiaSat
1 positions: Matlab coding

Development of the attitude determination and control software simulator for SiaSat
2 positions: Matlab/Simulink coding
Control of Aerospace Vehicles (prof. F. Celani)

Positions offered up-to-date 5, still available 5

Design of spacecraft attitude controller based on root locus
1 position. Prerequisites: Control Systems for Aerospace Engineering passed, Matlab coding capability

Design of autopilot for launch vehicle based on root locus
1 position. Prerequisites: Control Systems for Aerospace Engineering passed, Matlab coding capability

Design of spacecraft attitude controller using thrusters
1 position. Prerequisites: Control Systems for Aerospace Engineering passed, Matlab coding capability

Simulink implementation of spacecraft detumbling control laws using magnetorquers
1 position. Prerequisites: Advanced Control of Space Vehicles passed

Design and Simulink implementation of spacecraft attitude controller based on rotation matrices
1 position. Prerequisites: Advanced Control of Space Vehicles passed

Earth Observation Lab – EOSIAL (prof. G. Laneve)

Positions offered up-to-date 13, still available 13

Cloud mask on Sentinel-2 images
1 position: Matlab coding capability

Shadow mask taking into account topography and clouds on Sentinel-2 or Landsat 8 images
2 positions: Matlab coding capability

Identify stable reflectors for the Sardinia region
1 position: Matlab coding capability

Application of Hough transformation for detecting roads, edges, linear objects
1 position: Matlab coding capability

Developing and test a Vegetation Water Index based on Sentinel 2 images
1 position: Matlab coding capability, SNAP software package knowledge

Test burned area indices (NBR = Normalized Burn Ratio, BAI = Burned Area Index) on an area of interest
1 position: Matlab coding capability

Estimate Land Surface Temperatures by using MSG/SEVIRI images
1 position: Matlab coding capability

Compare crop growth using vegetation Index based on Sentinel 2 imagery
2 positions: Matlab coding capability

Compute vegetation fuel map by using Sentinel2 imagery, phytoclimatic data for Sardinia or Calabria region
2 positions: Matlab coding capability

Implement a soil erosion susceptibility method exploiting Earth Observation satellite images
1 position: Matlab coding capability

Nanosatellite Electronics Lab (prof. A. Nascetti)
Control of Aerospace Vehicles (prof. F. Celani)

Positions offered up-to-date 5, still available 5

Design of spacecraft attitude controller based on root locus
  1 position. Prerequisites: Control Systems for Aerospace Engineering passed, Matlab coding capability

Design of autopilot for launch vehicle based on root locus
  1 position. Prerequisites: Control Systems for Aerospace Engineering passed, Matlab coding capability

Design of spacecraft attitude controller using thrusters
  1 position. Prerequisites: Control Systems for Aerospace Engineering passed, Matlab coding capability

Simulink implementation of spacecraft detumbling control laws using magnetorquers
  1 position. Prerequisites: Advanced Control of Space Vehicles passed

Design and Simulink implementation of spacecraft attitude controller based on rotation matrices
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Test burned area indices (NBR = Normalized Burn Ratio, BAI = Burned Area Index) on an area of interest
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Compare crop growth using vegetation Index based on Sentinel 2 imagery
  2 positions: Matlab coding capability

Compute vegetation fuel map by using Sentinel2 imagery, phytoclimatic data for Sardinia or Calabria region
  2 positions: Matlab coding capability

Implement a soil erosion susceptibility method exploiting Earth Observation satellite images
  1 position: Matlab coding capability

Nanosatellite Electronics Lab (prof. A. Nascetti)
Positions offered up-to-date 9, still available 9

**On-Board Computer (OBC): firmware design**
1 position. Prerequisites: microcontrollers (basic knowledge), C-language programming

**OBC: development of self-test and calibration routines**
2 positions. Prerequisites: microcontrollers (basic knowledge), C-language programming

**OBC: development of main operation routines (TT&C, Logging, ...)**
2 positions. Prerequisites: microcontrollers (basic knowledge), C-language programming

**Development of Graphical User Interface for OBC test**
1 position. Prerequisites: Matlab or Java programming

**Setup of Flatbed Satellite**
1 position. Prerequisites: electronics (basic), Word or Latex (for documentation)

**Hardware In the Loop (HIL) Setup for Flatbed Satellite**
1 position. Prerequisites: FPGA (basic knowledge), Simulink

**HIL sensitivity analysis**
1 position. Prerequisites: FPGA (basic knowledge), Simulink

**Flight Mechanics Laboratory** (prof. P. Teofilatto)

Positions offered up-to-date 7, still available 7

**Mission analysis of the SiaSat**
2 positions: Matlab coding capability

**Analysis of interplanetary cubesat mission to Mars with ballistic capture**
1 position: Matlab coding capability

**Test bed development for the centre of mass and inertial moments experimental determination of 3U cubesat**
1 position: capability to work on experimental set up

**Review about the use of the cubesat standard for missions involving microsatellites of mass in the range 10 to 30 kg**
1 position: capability in collecting and analysing the data

**Use of CnC machine and 3D printer for the production of structural components of use of the Flight Mechanic Lab**
1 position: capability in using CnC and 3D printer

**Project of a small scaled gyroplane having deployable blades and trajectory guidance in view of a possible prototype**
1 position: aeronautical knowledge
Guidance and Navigation Lab (prof. G.B. Palmerini)

Positions offered up-to-date 10, still available 7

Experiments with Arduino boards exploiting INS/GPS
1 position: interest to work with Arduino microcontroller

Understanding Pulsar-based Navigation
1 position: In-depth study of PulsarNav technique, Matlab coding capability

Basic skills in technical drawing
1 position: interest in learning SolidWorks (in cooperation with GAUSS)

Real Time Control Capabilities
1 position: Matlab coding capability / Unix-Linux knowledge / microcontroller experience

Formation Flying Analysis
1 position: Matlab coding capability

Setup/rehearsal of a small rover mockup
1 position: Matlab coding capability, interest to work on experimental set up

Setup/rehearsal of a testebed to reproduce S/C proximity navigation
1 position: Matlab coding capability, interest to work on experimental set up

Analysis and experiments of the Optical Flow technique for image-based navigation
1 position: Matlab coding capability, interest to work on experimental set up

Experiments with GPS receivers
2 positions: Matlab coding capability, interest to work on experimental set up

Telecommunications and Ground Station (prof. A. Nascetti)

Positions offered up-to-date 5, still available 5

Forward Error Correction with HIL
1 position. Prerequisites: Telecommunications (basic knowledge), Simulink

Setup of Ground Station based on Software Defined Radio (SDR)
2 positions (also in team). Prerequisites: Telecommunications (basic knowledge), Matlab/ Simulink/Java

Setup of Synthetic Aperture Radar (SAR) simulation environment (Simulink)
1 position. Prerequisites: Telecommunications (basic knowledge), RF, Simulink

Setup of Wireless connection system for flatbed satellite
1 position. Prerequisites: Telecommunications and microcontrollers (basic knowledge), C- programming
Section II. Stages offered in external Labs / Industrial firms in Rome area

AVIO-ELV (Colleferro, outside Rome)
Positions offered up-to-date 2, still available 2

Technical Activities in Launcher’s Engineering
2 positions: selection on the basis of an interview

Thales Alenia Space Italia (via Saccomuro and via Tiburtina, outside GRA, Rome)
Positions offered up-to-date 1, still available none

Activities in the Observation, Exploration and Navigation Areas
1 position: selection on the basis of an interview

GAUSS srl (via Sambuca Pistoiese, Rome)
Positions offered up-to-date 4, still available 1

Analysis of Reaction Wheels for Small Satellites
1 position: interest in attitude control hardware. Selection on the basis of an interview
Experience in technical drawing
1 position: knowledge of SolidWorks. Selection on the basis of an interview
Experience in structural analysis
1 position: knowledge of ANSYS/NASTRAN. Selection on the basis of an interview

IONVAC PROCESS srl (Viale Anchise 24, 00071, Pomezia, Roma)
Positions offered up-to-date 1, still available 1

ION1. Sizing and design of a solid fuelled Ramjet engine
1 position: knowledge of SolidWorks/Autocad/Catia, Matlab coding and ANSYS/FLUENT
Section III. Stages offered in external Labs / Industrial firms outside Rome area

Stages in Propulsion disciplines to be carried out abroad. 4 possible positions. Lodging and board could be provided to students. Contact point for these programs is prof. A. Ingenito.

INSA Centre Val de Loire - Bourges, France
  Excellence Laboratory CAPRYSSES & PRISME Laboratory
  Numerical/experimental activity
  Positions offered up-to-date 2, still available 2

ULB School Engineering (Polytechnic School) - Brussels, Belgium
  Department Aero-Thermo-Mechanics
  Numerical/experimental activity
  Positions offered up-to-date 2, still available 2