## Course title : Global Navigation Satellite Systems

| Course Basic Information | |
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| **Academic Unit:** | Faculty of Civil Engineering |
| **Course title:** | Global Navigation Satellite Systems |
| **Level:** | Master |
| **Course Status:** | Mandatory |
| **Year of Study:** | Year 1, Semester 2 |
| **Number of Classes per Week:** | 2+2 |
| **ECTS Credits:** | 6 ECTS |
| **Time /Location:** | According to the Timetable |
| **Teacher:** | Prof.asoc.Dr. Perparim Ameti |
| **Contact Details:** | perparim.ameti@uni-pr.edu |
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| **Course Description:** | This course begins with basic knowledge on history of satellite geodesy, calculation of satellite orbits, satellite positioning, then continues with systems, observations and calculations, statistical concepts including filtering and smoothing Kelaman, application of GNSS. This course will end with other systems of satellite geodesy. |
| **Course Goals:** | To achieve theoretical and practical knowledge in global navigation satellite systems: GPS, GLONASS, GALILEO. |
| **Expected Learning Outcomes:** | After the course, students will be able to:<br>- describe the principle of satellite positioning methods, the main components in a satellite navigation system and their functions<br>- account for and analyse the influence of different error sources on the positioning precision<br>- plan, perform and process precise GNSS measurements<br>- identify proper instruments, measurement and processing methods for different applications |

| Student Workload (should be in compliance with student's Learnign Outcomes) | | | |
|---|---|---|---|
| **Activity** | **Hours** | **Day/ Week** | **Total** |
| Lectures | 2 | 15 | 30 |
| Theory/ Lab Work/Exercises | 2 | 15 | 30 |
| Practical Work | 1 | 10 | 10 |
| Consultations with the teacher | 5 | 1 | 5 |
| Field Work | 1 | 5 | 5 |
| Test, seminar paper | 1 | 15 | 15 |
| Homework | 1 | 15 | 15 |
| Self-study (library or home) | 1 | 10 | 10 |
| Preparation for final exam | 1 | 15 | 15 |

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|---|---|---|---|
| Assessment time (test, quiz, final exam) | | | |
| Projects, presentations, etc. | 1 | 15 | 15 |
| **Total** | | | **150** |

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| **Teaching Methods:** | - *Lecture*<br>- *Discussion during lectures*<br>- *Exercises*<br>- *Work in group* |
| **Assessment Methods:** | In evaluation, the percentage of the attendance of each partial evaluation in the final evaluation must be determined. One of the ways of evaluation would be:<br>First Evaluation: 15%<br>Second Evaluation: 15%<br>Homework or other engagement: 10%<br>Attendance 5%<br>Final Exam 55%<br>Total 100% |
| **Primary Literature:** | 1) Sjöberg, LE (2009) Theory of satellite geodesy, KTH<br>2) Isufi, E.: Sistemi i Pozicionimit Global - GPS, 2006. |
| **Additional Literature:** | 1) Hofmann-Wellenhof, et al. (2008): GNSS, Springe |

**Designed teaching plan**

| Week | Title of the Lecture |
|---|---|
| ***Week 1:*** | Introduction to satellite geodesy |
| ***Week 2:*** | Calculation of satellite orbits |
| ***Week 3*:** | Signal propagation in the atmosphere |
| ***Week 4:*** | Satellite positioning |
| ***Week 5:*** | Systems |
| ***Week 6*:** | Frames |
| ***Week 7:*** | Receivers and methods |
| ***Week 8:*** | State projected coordinates and heights |
| ***Week 9:*** | Satellite positioning: systems, observables and computations |
| ***Week 10:*** | Statistical concepts including filtering and smoothing |
| ***Week 11*:** | GNSS application |
| ***Week 12*:** | Other geodetic satellite systems |
| ***Week 13*:** | Static, DGPS and RTK |
| ***Week 14*:** | GPS and GNSS modernization |
| ***Week 15*:** | Knowledge on GNSS and its future |

**Academic Policies and Code of Conduct**

*We start and finish class on time.*
*Tools used during class must be cleaned and stored away at the end of class.*
*Mobile/smart phones, and other electronic devices (e.g. iPods) must be turned off (or on vibrate) and hidden from view during class time.*
*Laptop and tablet computers are allowed for quiet use only; other activities such as checking personal e-mail or browsing the Internet are prohibited.*

**Note | If a student has more than 3 class assignements evaluated below 50% he/she loses the right on taking the final exam. Evaluation is done from 0-100 %.**