



Course title: SATELLITE NAVIGATION

ECTS credit allocation (and other scores): 3

Semester: autumn

Level of study: ISCED-7 - second-cycle programmes (EQF-7)

Branch of science: Engineering and technology

Language: English

Number of hours per semester: 45

Course coordinator/ Department and e-mail: Adam Ciećko, PhD, Institute of Geodesy, a.ciecko@uwm.edu.pl

Type of classes: classes and lectures

Substantive content

CLASSES: Units of measurements used in navigation; difference of longitude/latitude; departure; compass rose; directions in navigation; course and bearing; magnetic field of Earth and ship/aircraft; magnetic compass; global coordinate systems; geodetic coordinates; geoid; speed and route of a vehicle; navigation along loxodrome; navigation along orthodrome; characteristics of GNSS navigation receivers; practical operation of GNSS navigation receiver

LECTURES: Introduction to navigation; historical review of navigation; mathematic fundamentals of navigation; physical fields of the Earth; time systems and time measurements; maps, projections, coordinate systems; electronic charts; standards for maritime and air navigation; terrestrial navigation; celestial navigation; radio navigation; nondirectional beacon; VOR; hyperbolic radionavigation systems; GNSS systems in navigation

Learning purpose: Understanding the fundamentals of navigation, methods and technical means of directing objects according to the route; determining the position, selecting appropriate route; determining the errors of measurement; practical using of GNSS technology in navigation.

On completion of the study programme the graduate will gain:

Knowledge: Is able to define the basic concepts of satellite navigation; has the theoretical basis used in determining the issues concerning position, course and speed in maritime, air and land navigation; is able to distinguish different units, systems, courses, bearings, compass corrections; identifies and describes techniques used in the process of navigation based on satellite technology

Skills: Can calculate navigation tasks and parameters; installs, operates and integrates (combines) navigation units, interprets navigation data and coordinates; controls and evaluates the process of navigation using navigation units; develops the navigation data, performs navigation planning process, uses the GNSS navigation receivers, solves problems related to navigation safety

Social Competencies: Works in a team performing selected tasks of navigation; is focused on broadening her/his knowledge related to the development of navigation, navigation tools and GNSS applications

Basic literature: 1) Hoffman-Wellenhof B., Legat K., Wieser M., Navigation - principles of positioning and guidance, Springer-Verlag, 2003; 2) Misra P., Enge P., Global Positioning System - Signals, Measurements and Performance, Jamuna Press, USA, 2006; 3) Czaplewski K., Wiśniewski Z, Nawigacja analityczna. Określanie pozycji i ocena dokładności, Bernardinum, 2017; 4) Wróbel F., Nawigacja morska. Zadania z objaśnieniami, Wydawnictwo morskie Gdańsk, 1987.



Supplementary literature: 1) Bowditch N., The American Practical Navigator, National Imagery and Mapping Agency, USA, 2002; 2) Hofmann-Wellenhof B., Lichtenegger H., Collins J., Global Positioning System, Theory and Practice, Springer-Verlag, Wien New York, 1997; 3) Januszewski J., Systemy satelitarne w nawigacji morskiej", Fundacja Rozwoju Wyższej Szkoły Morskiej w Gdyni, 2002.

The allocated number of ECTS points consists of: 75

Contact hours with an academic teacher: 50

Student's independent work: 25