

COURSE OUTLINE

1. Study programme information

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| 1.1 Higher education institution | Universitatea de Vest Timisoara |
| 1.2 Faculty / Department | Chemistry-Biology-Geography/ Department of Geography |
| 1.3 Sub-department | Geography |
| 1.4 Field of study | Geography |
| 1.5 Level of study | Masters |
| 1.6 Study programme / Qualification | Geographical Information Systems (GIS) |

2. Course information

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|-------------------------------|----|---|---|------------------------|---|-----------------|----|
| 2.1 Course title | | Location based services and their applicability | | | | | |
| 2.2 Course convenor/ Lecturer | | Dr. Octavian Iercan | | | | | |
| 2.3 Teaching assistant | | Dr. Octavian Iercan | | | | | |
| 2.4 Year of study | II | 2.5 Semester | 1 | 2.6 Type of assessment | C | 2.7 Course type | Op |

3. Total estimated time (hours of didactic activities per semester)

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| 3.1 Number of hours per week | 4 | of which: 3.2 lecture | 2 | 3.3 seminar/laboratory | 2 |
| 3.4 Total hours in the curriculum | 56 | of which: 3.5 lecture | 28 | 3.6 seminar/laboratory | 28 |
| Time distribution: | | | | | hours |
| Studying textbooks, course materials, bibliography and notes | | | | | 20 |
| Further research in libraries, on electronic platforms and in the field | | | | | 20 |
| Preparing seminars/ laboratories, homework, research papers, portfolios and essays | | | | | 20 |
| Tutoring | | | | | 20 |
| Examinations | | | | | 14 |
| Other activities | | | | | |
| 3.7 Total hours of individual study | | 94 | | | |
| 3.8 Total hours per semester | | 150 | | | |
| 3.9 Number of credits | | 6 | | | |

4. Prerequisites (if applicable)

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| 4.1 based on curriculum | <ul style="list-style-type: none"> GIS, Remote Sensing |
| 4.2 based on competencies | <ul style="list-style-type: none"> Basic programming with python, data processing techniques, relational databases, basis understanding of programming algorithms |

5. Conditions (if applicable)

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| 5.1 for the course | <ul style="list-style-type: none"> mandatory attendance for 70% of the courses 50% of the course will be onsite and 50% online block course over 1 week onsite |
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| 5.2 for the seminar/laboratory | <ul style="list-style-type: none"> ● Attendance is mandatory. A maximum of 3 absences is tolerated ● All laboratory tasks need to be completed ● 50% of the seminar will be onsite and 50% online |
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6. Accumulated specific competencies

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| Professional competencies | <ul style="list-style-type: none"> ● Understanding the importance of Location Based Services (LBS); ● Grasping the methodologies involved for using LBS; ● Understanding the specifics of POI collection needed in LBS; ● Knowing the methodologies for obtaining a location using diverse hardware components; ● Knowing the algorithms used and analytical methodologies for determining locations in LBS; ● Critical analysis of determining correct positioning using LBS ● Parallel analysis between algorithms and sensors using for localization ● Using hardware such as: smartphone, GPS receiver, PDA, etc. ● Using ESRI ArcGIS for data transfer and processing including Python processing ● Using OpenSource GIS such as Quantum GIS and GRASS products ● Using high end GPS receiver for precise location determination and understanding the relativity of the mitigated GPS collection techniques ● Utilizing various connectivity bridges (WLAN, Bluetooth, GSM, UMTS) in LBS context ● Data processing and data integration in GIS projects for navigation and LBS ● Obtaining Smart Analytics with BigData methodologies for generating results from collected and sourced data in the LBS context |
| Transversal competencies | <ul style="list-style-type: none"> ● Apply working strategies for efficiency and responsibility based on principles, norms and values according to the ethical code of conduct ● Apply efficient and collaborative working techniques in a multiskillset and multidisciplinary environment, respect for multiculturalism and diversity as well as acceptance for difference of opinion ● Self-assessment of the need for professional development aiming to increase the labor market adaptability |

7. Course objectives (as resulting from the accumulated specific competencies)

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| 7.1 General objective | Learning the concepts behind location based services and utilization of various methods of connectivity |
| 7.2 Specific objectives | Developing a product oriented team organization and problem solving attitude |

8. Content

| 8.1 Lecture | Teaching methods | Observations |
|--|---|--------------|
| 1. Introduction to Location Based Services 2. GPS, Galileo and satellite navigation | Lecture, heuristic conversation, problem solving. | |

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|---|--|----------------------------|
| <ol style="list-style-type: none"> 3. Determining location with WLAN and Bluetooth 4. Controlled determination of location with WLAN 5. Determining location with WLAN and no calibration 6. Determining location with Time-of-arrival method for WLAN 7. Determining location using GSM and UMTS networks 8. Security and privacy in LBS context 9. Multisensor determination of location for results correction and improvement 10. Algorithms for trajectory prediction 11. LBS and data processing 12. Smart analytics and data extraction | | |
| <p>Bibliography</p> <p>Schiller, Jochen, and Agnès Voisard, eds. Location-based services. Elsevier, 2004.</p> <p>Assessing the business impact of location based services, 2004. Proceedings of the 37th Hawaii International Conference on System Sciences.</p> <p>L. S. A.-M. Nivala, An approach to intelligent maps: Context awareness, The 2nd Workshop on 'HCI in Mobile Guides', (2003).</p> <p>R. S. Ajay Magon, Lbs, the ingredients and the alternatives. http://www.gisdevelopment.net/technology/lbs/techlbs006pf.htm.</p> <p>M. G. B. Schilit, J. Hong, Wireless location privacy protection, IEEE JNL, Volume 36 (2003), pp. 135–137.</p> <p>A. Brimicombe, Gis - where are the frontiers now?, Proceedings GIS 2002, (2002), pp. 33–45.</p> <p>F. P. Carmine Ciavarella, The design of a handheld, loaction-aware guide for indoor environments, Springer-Verlag London, (2004).</p> <p>G. George Liu, Jr. Maguire, A class of mobile motion prediction algorithms for wireless mobile computing and communications, Mobile Networks and Applications, (1996), pp. 113–121.</p> <p>T. Helmreich, Hier geht's lang mit den location based services, 2002. http://www.contentmanager.de/magazin/news_h3153-print_hier_gehts_lang_mit_den_location-based.html.</p> | | |
| <p>8.2 Seminar / laboratory</p> | <p>Teaching methods</p> | <p>Observations</p> |
| <ol style="list-style-type: none"> 1. Display data used in LBS project using webbased applications such as Google Maps/Open Streetmap and local instalations such as ESRI ArcGIS or Google Earth 2. Basic data processing and project preparation 3. Learning LBS importance and utilization using preinstalled application on mobile devices 4. Field work: test various hardware with LBS applicability and multi sensor technologies 5. Use of GIS data in corroboration with mobile device data collected in the field for better understanding of LBS. 6. Contribute to a data gathering exercise for future generations and so creating a databased for LBS of Timisoara and the region. 7. Extract smart analytics with python and other programming tools using BigData methodologies | <p>Scientific explanation, case studies, demonstration, problem solving applications</p> | |
| <ol style="list-style-type: none"> 8. Team Project | <p>Team work, results marketing and presentation, application development</p> | |

9. **Corroborating course content with the expectations held by the representatives of the epistemic community, professional associations and typical employers in the field of the study programme**

Course content is conforming to the standard and state of the art research in the field as well with the technological state of the art for LBS in the industry. The course stimulates the students to work as a team to a common goal to find and solve spatial and temporal problems a LBS user experiences in real life. Utilization of GIS and relational databases knowledge as well as better understanding of data manipulation using software scripting languages allows the student to interact in the future with the GIS industry as well as with the data analytics organizations. The Software used in the course is high-end GIS software used by the majority of the businesses and institutions dealing with GIS.

10. **Assessment**

| Type of activity | 10.1 Assessment criteria | 10.2 Assessment methods | 10.3 Weight in the final mark |
|---|---|-------------------------|-------------------------------|
| 10.4 Lecture | Understanding and assimilation of LBS knowledge | Written or oral exam | 50% |
| 10.5 Seminar / laboratory | Presentation and project report content quality | Presentation of results | 50% |
| 10.6 Minimum performance standard | | | |
| <ul style="list-style-type: none"> Minimum 5 for both Lecture and Seminar results. | | | |

Date 15 09 2022

Course convenor's signature

Teaching assistant's signature

Date of approval in the department

Head of department's signature