### Description of learning outcomes for module

<table>
<thead>
<tr>
<th>MLO code</th>
<th>Student after module completion has the knowledge/ knows how to/is able to</th>
<th>Connections with FLO</th>
<th>Method of learning outcomes verification (form of completion)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skills</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M_U001</td>
<td>Umie tworzyć, uruchamiać i dokumentować zaawansowane modele analityczne w aplikacji ArcGIS Model Builder</td>
<td>GK1A_U15, GK1A_U03, GK1A_U18</td>
<td>Execution of exercises, Execution of a project</td>
</tr>
<tr>
<td>M_U002</td>
<td>Potrafi analizować, tworzyć i wykorzystywać w oprogramowaniu ArcGIS proste skrypty w języku Python</td>
<td>GK1A_U15, GK1A_U03, GK1A_U18</td>
<td>Execution of exercises, Execution of a project</td>
</tr>
<tr>
<td>M_U003</td>
<td>Potrafi uruchamiać narzędzia ArcGIS w trybie batchowym</td>
<td>GK1A_U15</td>
<td>Execution of exercises</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M_W001</td>
<td>Zna podstawy języka programowana Python</td>
<td>GK1A_W09</td>
<td>Execution of a project</td>
</tr>
<tr>
<td>M_W002</td>
<td>Posiada wiedzę o możliwościach automatyzacji procesów analitycznych w oprogramowaniu ArcGIS</td>
<td>GK1A_W15</td>
<td>Execution of a project</td>
</tr>
</tbody>
</table>

### FLO matrix in relation to forms of classes
<table>
<thead>
<tr>
<th>MLO code</th>
<th>Student after module completion has the knowledge/ knows how to/is able to</th>
<th>Form of classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lectures</td>
</tr>
<tr>
<td>M_U001</td>
<td>Umie tworzyć, uruchamiać i dokumentować zaawansowane modele analityczne w aplikacji ArcGIS Model Builder</td>
<td>-</td>
</tr>
<tr>
<td>M_U002</td>
<td>Potrafi analizować, tworzyć i wykorzystywać w oprogramowaniu ArcGIS proste skrypty w języku Python</td>
<td>+</td>
</tr>
<tr>
<td>M_U003</td>
<td>Potrafi uruchamiać narzędzia ArcGIS w trybie batchowym</td>
<td>-</td>
</tr>
</tbody>
</table>

**Skills**

- **M_U001**: Umie tworzyć, uruchamiać i dokumentować zaawansowane modele analityczne w aplikacji ArcGIS Model Builder
  - Lectures: -
  - Auditorium classes: -
  - Laboratory classes: -
  - Project classes: +
  - Conversation seminar: -
  - Seminar classes: -
  - Practical classes: -
  - Fieldwork classes: -
  - Workshops: -
  - Others: -
  - E-learning: -

- **M_U002**: Potrafi analizować, tworzyć i wykorzystywać w oprogramowaniu ArcGIS proste skrypty w języku Python
  - Lectures: +
  - Auditorium classes: -
  - Laboratory classes: -
  - Project classes: +
  - Conversation seminar: -
  - Seminar classes: -
  - Practical classes: -
  - Fieldwork classes: -
  - Workshops: -
  - Others: -
  - E-learning: -

- **M_U003**: Potrafi uruchamiać narzędzia ArcGIS w trybie batchowym
  - Lectures: -
  - Auditorium classes: -
  - Laboratory classes: -
  - Project classes: +
  - Conversation seminar: -
  - Seminar classes: -
  - Practical classes: -
  - Fieldwork classes: -
  - Workshops: -
  - Others: -
  - E-learning: -

**Knowledge**

- **M_W001**: Zna podstawy języka programowania Python
  - Lectures: +
  - Auditorium classes: -
  - Laboratory classes: -
  - Project classes: +
  - Conversation seminar: -
  - Seminar classes: -
  - Practical classes: -
  - Fieldwork classes: -
  - Workshops: -
  - Others: -
  - E-learning: -

- **M_W002**: Posiada wiedzę o możliwościach automatyzacji procesów analitycznych w oprogramowaniu ArcGIS
  - Lectures: +
  - Auditorium classes: -
  - Laboratory classes: -
  - Project classes: +
  - Conversation seminar: -
  - Seminar classes: -
  - Practical classes: -
  - Fieldwork classes: -
  - Workshops: -
  - Others: -
  - E-learning: -

**Module content**

**Lectures**

Overview of ArcGIS workflows automating possibilities (batch processing, models and toolsets, Python scripts).
Introduction to Python
Interpreter basics. Other programming languages comparison. Variable assignment, mathematical and logical operators. Base data types and their representation. Keywords and complex structures. Mutable objects.
Introduction to object oriented programming in Python. Class, object and method construction, inheritance and polymorphism. Script modularisation methods and library import. Standard libraries and most important elements.
The ArcPy Python module. Python scripts in ArcGIS.
Building model documentation.
**Project classes**
Introduction to Python. Scripts and program flow control. Script autohing tools. Error correction and interpretation. Conditionals, loops and exception handling. Introduction to ArcPy, creating a basic Python scripts for ArcGIS.

**Method of calculating the final grade**
Evaluation of student activity during classes and student project. The final grade is calculated as a weighted average of grades. The algorithm for calculating the final assessment is given to students during first meeting.

**Prerequisites and additional requirements**
Prerequisites: Basic knowledge of ArcGIS software. Basic knowledge of English language. During the first meeting the teacher will present:
- the acceptable number of students absence in the class and the method and manner of compensating for the backlog caused by absence;
- the rules for obtaining credits within basic term.
Before the end of the semester the teacher will decide the rules and deadlines for resit. A student may proceed to a resit twice.

**Recommended literature and teaching resources**

**Scientific publications of module course instructors related to the topic of the module**

**Additional information**
None
# Student workload (ECTS credits balance)

<table>
<thead>
<tr>
<th>Student activity form</th>
<th>Student workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in lectures</td>
<td>15 h</td>
</tr>
<tr>
<td>Participation in project classes</td>
<td>30 h</td>
</tr>
<tr>
<td>Contact hours</td>
<td>6 h</td>
</tr>
<tr>
<td>Completion of a project</td>
<td>22 h</td>
</tr>
<tr>
<td>Realization of independently performed tasks</td>
<td>30 h</td>
</tr>
<tr>
<td>Summary student workload</td>
<td>103 h</td>
</tr>
<tr>
<td>Module ECTS credits</td>
<td>4 ECTS</td>
</tr>
</tbody>
</table>