# UNIVERSITY of NICOSIA

## Course Syllabus

| Course Code | Course Title | ECTS Credits |
|---|---|---|
| ARCH-211 | Structural Mechanics - Statics I | 4 |
| **Prerequisites** | **Department** | **Semester** |
| ARCH-111 | Architecture | Fall |
| **Type of Course** | **Field** | **Language of Instruction** |
| Required | Architecture | English |
| **Level of Course** | **Lecturer(s)** | **Year of Study** |
| 1st Cycle | Dr Tonia Sophocleous Lemonari | 2nd |
| **Mode of Delivery** | **Work Placement** | **Corequisites** |
| Face to face | N/A | - |

**Course Objectives:**

The main objectives of the course are to:
- Introduce the principles of Statics through examples and demonstrations
- Illustrate principles of Axial Resistance, Joinery and Lateral Stability.
- Introduce the principles of truss structural systems' behavior
- Analyse case studies showcasing the architectural implications of structure
- Implement complex systems combining 2dimensional arrangements of members in both tension and compression.
- Introduce structural analysis methods (i.e. analytical, graphical) to solve structural models
- Use computer modelling for structural analysis, SAP2000 software
- Interpret analytical and graphical calculations following the method of joints and sections
- Compare the magnitude of forces such as dead, live and lateral
- . Interpret structural behavior of systems
- Utilise hands-on and rules of thumb in aiding the understanding of structural systems.

**Learning Outcomes:**

After completion of the course students are expected to be able to:

1. Describe and analyse structural systems in architecture.
2. Analyse truss systems following a qualitative analytical process of hands on observation.
3. Analyse structural systems of realised buildings.

4. Compare building structure systems and their behavior under various types of load action.
5. Illustrate concepts of structural types.
6. Interpret modeling results of the professional software SAP2000.
7. Employ elementary mathematics to structural systems.
8. Apply rules of thumb to predict structural behavior.
9. Asses the computer software results.
10. Evaluate structural elements using simple equilibrium checks.
11. Judge structural member sizing towards optimization.
12. Compare and evaluate structure schemes through case study analysis.

**Course Content:**

1. Basic Structure Concepts: Statics
2. Forces. Components. Resultants. Actions.
3. Moments and Couples.
4. Force Systems.
5. Equilibrium of Forces. Resultant Force. Redundancy and Stability.
6. Free body diagrams.
7. Equilibrium of Particles.
8. Equilibrium of Bodies.
9. Supports. Member support conditions.
10. Actual Building Cases. Truss types.
11. Simple trusses. Funicular trusses. Fan trusses.
12. Compound trusses. Complex trusses.
13. Analysis and preliminary design of trusses.
14. Modelling trusses using SAP2000.
15. Determinate and indeterminate trusses.

**Learning Activities and Teaching Methods:**

The teaching method in this course consists of Lectures, Individual and group work, Case studies, Tutorials, Presentations, Pin-ups.

**Assessment Methods:**

Project presentation. Poster. Pin-up, Weekly assignments and Final Exam.

**Required Textbooks** / **Readings:**

| Title | Author(s) | Publisher | Year | ISBN |
|---|---|---|---|---|
| Building Support Structures Analysis and Design using SAP2000 software | Wolfgang Schueller | Computers and Structures, Inc. Berkley, California | 2008 | 978-0-923907-75-4 |

**Recommended Textbooks** / **Readings:**

| Title | Author(s) | Publisher | Year | ISBN |
|---|---|---|---|---|
| Engineering Mechanics Statics | Russell C. Hibbeler | Prentice Hall | 2006 | 013-127-844-4 |
| Structures, 6/E | Daniel Lewis Schodek, Harvard University Martin Bechthold, Harvard University | Prentice Hall | 2008 | 9780131789395 |
| Structure and Architecture | Angus J. Macdonald, Uni of Edinburg | Elsevier, Architectural Press | 2001 | 0 7506 4793 0 |
| Structure As Architecture | Andrew W. Charleson | Elsevier, Architectural Press | 2005 | 0 7506 6527 0 |