# ■ CC62 - Differential Geometry I

## GENERAL

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| **SCHOOL** | EXACT SCIENCES |
| **DEPARTMENT** | MATHEMATICS |
| **LEVEL OF STUDIES** | UNDERGRADUATE |
| **COURSE CODE** | CC62 **SEMESTER** F |
| **COURSE TITLE** | DIFFERENTIAL GEOMETRY I |

| INDEPENDENT TEACHING ACTIVITIES | WEEKLY TEACHING HOURS | ECTS |
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| Lectures | 4 | 7 |

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| **COURSE TYPE** | Scientific Field |
| **PREREQUISITE COURSES** | Linear Algebra I-II<br>Infinitesimal Calculus III-IV |
| **LANGUAGE OF TEACHING AND EXAMINATIONS** | Greek/English |
| **THE COURSE IS OFFERED TO ERASMUS STUDENTS** | YES |
| **COURSE WEBSITE (URL)** | http://eclass.uowm.gr/ |

## LEARNING OUTCOMES

| Learning Outcomes |
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| Upon successful completion of the course, the students will be able to:<br>• find the Frenet trihedron of a curve in space with parameterization along an arc and calculate its curvature and torsion,<br>• check if a surface is regular and find the tangent plane of a regular surface,<br>• calculate the first and second fundamental form and the various curvatures of a surface, |

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| • formulate and understand the meaning of Gauss' Theorema Egregium. | |

| **General Competencies** |
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| • Individual work. <br> • Promotion of free, creative and inductive thinking. |

## CONTENT OF THE COURSE

<u>Curves in the plane and in space:</u> tangent of a normal curve, arc length-physical parameter, accompanying Frenet trihedron, curvature and torsion, fundamental theorem of curves, the isoperimetric inequality.

<u>Normal Surfaces:</u> Complex Function Theorem and normal surfaces, tangent plane, first and second fundamental form, Gauss mapping, shape operator, vertical and mean curvature, principal curvatures, Gauss curvature, the "Marvelous" Theorem (Theorema Egregium).

## TEACHING AND LEARNING METHODS - EVALUATION

| TEACHING METHOD | In the classroom. |
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| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** | Use of e-class. <br> Communication through face-to-face discussions and e-mails. |
| **TEACHING ORGANIZATION** | <table><tr><th>Activity</th><th>Semester Workload</th></tr><tr><td>Lectures</td><td>52 hours</td></tr><tr><td>Projects</td><td>50 hours</td></tr><tr><td>Individual Study</td><td>73 hours</td></tr><tr><td>Course Total (25 hours per ECTS)</td><td>175 hours</td></tr></table> |
| **STUDENT EVALUATION** | Written final examination 100%. |

## RECOMMENDED BIBLIOGRAPHY

1. Barett O'Neil, Elementary Differential Geometry, Third Edition, Publications ITE, Crete Un. Press, 2005 (Greek).
2. Pressley A, Elementary Differential Geometry, Third Edition, Publications ITE, Crete Un. Press , 2011 (Greek).

3. B. Papantoniou, Differential  Geometry, Patras Un. Press (Greek).
4. D. Koutroufiotis, Elementary Differential Geometry, Publications Leader Books, 2006 (Greek).
5. Arvanitogeorgos A, Elementary Differential Geometry, e-book, Kallipos Repository , 2015 (Greek).