# Computational Geometry Course Specifications

**Faculty:** Computer and Informatics
**Department:** Scientific Computing

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|---|---|---|
| **Program(s) on which the course is given** | **:** | Bachelor in Computer & Information Sciences |
| **Major or Minor element of programs** | **:** | Scientific Computing |
| **Department offering the program** | **:** | Scientific Computing |
| **Department offering the course** | **:** | Scientific Computing |
| **Academic year / Level** | **:** | 4th Year/ B.Sc. |
| **Date of specification approval** | **:** | 15/3/2010 |

## A. Basic Information

**Title:** Computational Geometry **Code:** SCC 437

**Lecture:** 3 hrs/week **Practical:** 2 hrs/week **Tutorial:** ---

**Credit Hours:** --- **Total:** 5 hrs/week

## B. Professional Information

### 1. Overall Aims of Course:

This course introduces students to computational geometry. Upon completion of this course, students will have Good-knowledge of computational geometry topics like Line-segment intersection, segment-segment intersection, Voronoi diagram, Delaunay triangulation, Motion Planning, etc. Graduates will be able to design efficient algorithms for topics in computational geometry.

## 2. Intended Learning Outcomes of Course (ILOs):

### a- Knowledge and Understanding:

a1- State Basics of Computational Geometry.

a2- Explain Line segment intersection.

a3- Explain Segment-segment-segment intersection.

a4- Explain Visibility graph.

a5- Explain Voronoi-Diagrams.

a6- State Delaunay triangulations.

a7- Explain Motion planning.

### b- Intellectual Skills:

b1- Conclude an efficient algorithm for the given problem.

b2- Learn how to use systematic steps in the proof of the theories.

b3- Integrate application of the geometrical algorithms in other scientific area.

### c- Professional and Practical Skills:

c1- Design an effective algorithm for the geometrical problem.

c2- Write and integrate an effective computer programs for the geometrical algorithm.

### d- General and Transferable Skills:

d1- Understand and the geometrical problem and discuss how to deal with it as a data to be processed.

d2- Present and Write effective computer programs that employ efficient algorithms.

d3- Analyze and design algorithms for solving scientific problems related to other disciplines.

**e. Attitude:**

e1- A knowledge and respect of ethics and ethical standards in relation to a major area of study.

e2- Relationship Emphasis a successful with other students.

e3- Learn how to make relation with other, and the limit of this relation.

**3. Contents:**

| Topic | No. of hours | Lecture | Tutorial/ Practical |
|---|---|---|---|
| Design and analysis of efficient geometric algorithms (Part I) | 5 | 3 | 2 |
| Design and analysis of efficient geometric algorithms (Part II) | 5 | 3 | 2 |
| Intersection (Part I) | 5 | 3 | 2 |
| Intersection (Part II) | 5 | 3 | 2 |
| Voronoi Diagrams (Part I) | 5 | 3 | 2 |
| Voronoi Diagrams (Part II) | 5 | 3 | 2 |
| Voronoi Diagrams (Part III) | 5 | 3 | 2 |
| Delaunay Triangulations (Part I) | 5 | 3 | 2 |
| Delaunay Triangulations (Part II) | 5 | 3 | 2 |
| Random Sampling (Part I) | 5 | 3 | 2 |
| Random Sampling (Part II) | 5 | 3 | 2 |
| Motion Planning(Part I) | 5 | 3 | 2 |
| Motion Planning(Part II) | 5 | 3 | 2 |
| Motion Planning: application Revision | 5 | 3 | 2 |