SYLLABUS

SUBJECT: GRAPHICS AND HUMAN – COMPUTER COMMUNICATION

TEACHER: Prof. PRz BOGDAN KWOLEK, PhD, DSc, Eng.

COURSE DESCRIPTION:
The purpose of the course is to familiarise the students with theoretical fundamentals of computer graphics. One of the aims of the course is to widen the knowledge of tools and methodologies for the development of interactive computer systems for human use.

LECTURE:
Computer graphics and its fundamentals: Linear algebra: vectors, points, matrices, coordinate systems, transformations, 3D-2D projections. Object representations: points, polygons, triangles, curved surfaces. Geometric modelling. Shading and lighting. Textures. 2D image processing. Methods and tools of computer graphics: Overview of OpenGL and Jogl. Java 2D, Java 3D. Methodologies for the development of interactive computer systems: Visual object detection, skin colour detection. Face tracking, eye tracking, face recognition. Selected problems of speech recognition and synthesis.

CLASSES:
Laboratory exercises concerning the design and implementation of interactive computer interfaces. Topics include graphics input and output, the graphics pipeline, image manipulation, three-dimensional transformations, basics of modelling and animation, simple shading models and their hardware implementation. Additional topics include vision-based object detection and tracking. Laboratory exercises allow the students to investigate the lecture material by writing applications in Java using Jogl, Java 2D and 3D. The second part of the class includes a project involving the design, implementation, and testing of an interactive application.

LEARNING OUTCOMES:
Students will acquire a basic knowledge about fundamentals of computer graphics, computer vision, and interfaces supporting human computer interaction.

GRADING POLICY:
LECTURE: Written test.
CLASSES: Written test and short questions during classes.

TIMETABLE:
LECTURE: 1h x 15 weeks = 15 hours (1 semester)
CLASSES: 3h x 15 weeks = 45 hours (1 semester)

TEXTBOOK AND REQUIRED MATERIALS:

1. Jankowski M., Elementy grafiki komputerowej, WNT 1990.
2. Pavlidis T., Grafika i przetwarzanie obrazów, WNT 1987.
3. Zabrodzki J. (red.), Grafika komputerowa, WNT 1995.
4. Shreiner D., Woo M., Neider J., OpenGL Programming Guide: The official guide to learning OpenGL, Addison-Wesley Publishing Company 1999.
5. Watkins C. D., Sadun A., Marenka S., Nowoczesne metody przetwarzania obrazu, WNT, Warszawa 1995.

PREREQUISITES:
High school course in mathematics, a course in Java programming.