**Suggested research topics**

**Winter semester of the academic year 2019/2020**

|  |
| --- |
| **Course name in Arabic: النمذجة والمحاكاة** |
| **Course name in English: Simulation and modelling** |
| **Dr. Reda M. Hussien** |
| **Level: 3rd Level** |
| **Departments:**  **Information System**  **Software Engineering** |

**Write a Software Project which Includes the Following Items:**

* **Title Page:** In the title page, you have to write your desired title for your project.
* **Table of contents:** In this section, You have to write the outline for your table of contents.
* **Problem Definition:** The initial step involves defining the goals of the study and determine what needs to be solved. The problem is further defined through objective observations of the process to be studied. Care should be taken to determine if simulation is the appropriate tool for the problem under investigation.
* **Project Planning:** The tasks for completing the project are broken down into work packages with a responsible party assigned to each package. Milestones are indicated for tracking progress. This schedule is necessary to determine if sufficient time and resources are available for completion.
* **System Definition:** This step involves identifying the system components to be modeled and the performance measures to be analyzed. Often the system is very complex, thus defining the system requires an experienced simulator who can find the appropriate level of detail and flexibility.
* **Model Formulation:** Understanding how the actual system behaves and determining the basic requirements of the model are necessary in developing the right model. Creating a flow chart of how the system operates facilitates the understanding of what variables are involved and how these variables interact.
* **Input Data Collection & Analysis:** After formulating the model, the type of data to collect is determined. New data is collected and/or existing data is gathered. Data is fitted to theoretical distributions. For example, the arrival rate of a specific part to the manufacturing plant may follow a normal distribution curve.
* **Model Translation:** The model is translated into programming language. Choices range from general purpose languages such as Java or simulation programs such as Arena.
* **Verification & Validation:** Verification is the process of ensuring that the model behaves as intended, usually by debugging or through animation. Verification is necessary but not sufficient for validation, that is a model may be verified but not valid. Validation ensures that no significant difference exists between the model and the real system and that the model reflects reality. Validation can be achieved through statistical analysis. Additionally, face validity may be obtained by having the model reviewed and supported by an expert.
* **Experimentation:** Experimentation involves executing the simulation runs.

|  |  |
| --- | --- |
| Professor Signature | Date |

**Sample Project ideas**

1. **Webserver request response management**
2. **Bus Scheduling System**
3. **Clinic Management System**
4. **Single function of Bank system**