Subject Description Form

Subject Code	COMP211
Subject Title	Data and System Modeling
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite/Co-requisite: Nil Exclusion: COMP207, AMA217
Objectives	• To introduce students to the concepts and applications of probability and statistics. • To help students attain techniques for modeling and analyzing data and systems that are important for success in upper-level computing subjects.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: *Professional/academic knowledge and skills* (a) understand the association of probability and statistics with system phenomena; (b) apply different distributions to the process of system design and analysis; (c) possess the capability to read research papers in which concepts are expressed formally in terms of probability and statistics; (d) acquire skills to formulate hypotheses and decide when to accept/reject them; *Attributes for all-roundedness* (e) solve problems in a systematic manner; (f) visualize and classify system behavior analytically. **Alignment of Programme Outcomes:** Programme Outcome 1: It makes the student learn to present results, which are produced from the assignment project(s) that verify what they have learned in class. The quality of the report(s) measures how the student(s) has mastered what they learned. Programme Outcome 2: It helps student(s) grasp what factors would affect system correctness and stability. Programme Outcome 3: The team assignment helps students learn how to collaborate ethically.

<table>
<tr><td></td><td>Programme Outcome 4: It helps students polish their critical thinking through the process of analyzing the project/programming results.

Programme Outcome 5: The laboratory exercises and project assignments improve the students' problem solving skills.

Programme Outcome 7: The group project inculcates team spirit.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>
<table>
<tr><th>Topic</th><th>Duration of Lectures</th></tr>
<tr><td>1. Probability
Conditional probability; Bayes's rules; random variables; expectation; Stochastic process; Poisson and exponential distributions.</td><td>7.5</td></tr>
<tr><td>2. Statistics
Sampling, sample mean and variance; normal, χ-squared, t- and F-distributions; statistical inference and estimation methods; hypothesis testing.</td><td>10</td></tr>
<tr><td>3. Data and system modeling techniques
Problem formulation; data modeling and system modeling; deterministic and random processes; sampling, estimation and inductive inference; memoryless distributions.</td><td>7.5</td></tr>
<tr><td>4. Queuing models
Different Markov models (M/M/1, M/M/n, M/G/1) with limited and unlimited capabilities.</td><td>10</td></tr>
<tr><td>Total</td><td>35</td></tr>
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<tr><td>Teaching/Learning Methodology</td><td>The methodology consists of three main parts other that lectures:

i) understand and rehearse – understanding is deepened through repeated class, tutorial and take-home exercise; basically the students are drilled in important topics by resolving them alone and then in open discussions.

ii) associate – at this level effective learning is easily achieved by associating with hand-on experience; for this reason the theories are practiced in laboratory exercises and group projects in which students can discuss and learn from one another with a team spirit.

iii) test and examine – this reinforces the rehearsal in the learning process so that short-term items can become long-term memory.</td></tr>
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Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
1. Assignments	10%	✓	✓	✓	✓	✓	✓
2. Lab exercises			✓			✓	✓
3. Project	30%	✓	✓	✓	✓	✓	✓
4. Mid-term	15%	✓			✓		
5. Examination	45%	✓	✓	✓	✓	✓	✓
Total	100 %						

The assessment methods are appropriate to produce the expected outcome because they together represent an effective rehearsal process, in light of cognitive science, that transfers knowledge in the short-term memory into the long-term memory.

Student Study Effort Required

Class contact:	
▪ Lecture	35 Hrs.
▪ Tutorial	14 Hrs.
Other student study effort:	
▪ Assigned reading	10 Hrs.
▪ Take-home exercise	10 Hrs.
Total student study effort	69 Hrs.

Reading List and References

1. Ross, S.M., Introduction to Probability Models, 9th Edition, Academic Press, 2007
2. Walpoleand, R.E. and Myers, R.H., Probability and Statistics for Engineers and Scientists, 8th Edition, Prentice Hall, 2007
3. Jain, R., The Art of Computer Systems Performance Analysis, Techniques for Experimental Design, Measurement, Simulation, and Modeling, Wiley, 1991