UNIVERSITY OF NAIROBI
Department of Computing & Informatics
CCC530: Foundational Concepts and Trends in Computer Science

Purpose

- To provide grounding knowledge of foundational concepts in key computer science areas to equip students with the knowledge, skills and interest to investigate areas of current research more deeply. The course will also expose the student to trends and ongoing research in key computer science areas, preparing them to identify relevant research areas in their chosen specialization track.

Learning Outcomes

At the end of the course learners are expected to:

- Develop a systematic understanding and critical awareness of Computer Science with an emphasis in Distributed Computing and Computational Intelligence.
- Demonstrate understanding of the key foundational computer science concepts required for further specialization and research.
- Illustrate a broad understanding of trends and emerging technologies in Computer Science.
- Articulate key research areas and problems in DCT and CI thematic areas in Computer Science

Delivery

Lectures, Guided Seminars, Lectures, Group-Based Learning and Independent Studies.

Mode of Delivery: e-Classroom

Duration: 80 Hours

Content

Overview of **ICT for Development**: Community and Societal Development needs, Role of Innovation in Organizations, ICTs in Selected Societal Sectors.
Overview of **Distributed Computing**: Operating Systems, Computer Networks, Network Security.
Current Trends in Distributed Computing: IoT, Blockchain.
Overview of **Computational Intelligence**: Artificial Intelligence, Machine Learning, Knowledge Discovery; Current Trends in Computational Intelligence: Language Technologies, Robotics and Computer Vision, Embedded Intelligent Systems, Deep Learning.

Course Schedule

Week	Topic
Week 1 to 4 *4 – 29 Oct*	**Key Thematic Areas in Computer Science**: Mathematics for Computer Science, Computer Architecture, Networking & Communications, Programming, Information Systems, Management of Organization & Business, Software Engineering, Computational Intelligence. **Emerging Developmental and Societal Needs**: Developmental Issues, Innovation and Application of Computing Technologies in domains such as social innovation, health, agriculture, climate change and adaptation, education, law, transport *Project Presentations*
Week 5 to 8 *1 – 26 Nov*	**Overview of Computational Intelligence**: Introduction to Artificial Intelligence, Machine Learning, Knowledge Discovery **Current Trends in Computational Intelligence**: Language Technologies, Robotics and Computer Vision, Embedded Intelligent Systems, Deep Learning. *Project Presentations*
Week 9 to 12 *29 Nov – 17 Dec* *3 – 7 Jan*	**Overview of Distributed Computing**: Operating Systems, Computer Networks, Network Security **Current Trends in Distributed Computing**: IoT, Blockchain *Project Presentations*
Week 13 *10 – 14 Jan*	*Project Presentations on Computing for Development*
Week 14 *17 – 21 Jan*	*Project Presentations on Computational Intelligence*
Week 15 *24 – 28 Jan*	*Project Presentations on Distributed Computing*
Week 16 to 18 *31 Jan – 18 Feb*	*Term Paper Presentations* *University Examinations*

Texts

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Key Resources

- University e-Repository
- Google Scholar
- Research Gate
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Journals

- The Journal of Product Innovation Management
- Electronic Journal of Information Systems in Developing Countries
- Journal of Machine Learning Research

- International Journal of Business Intelligence and Data Mining
- International Journal of Data Science and Analytics
- International Journal of Computer Vision
- Pattern Analysis and Machine Intelligence
- International Journal of Critical Infrastructure Protection

Field Work

- Nairobi Innovation Week
- University Research Week

Student Obligation: To qualify to sit for the final examination a student shall:

- Attend at least two thirds of the lecture sessions
- Undertake and submit all assignments given
- Participate in group work and discussions

Lecturer Obligation: The lecturer shall:

- Offer lectures as scheduled
- Provide all required teaching material
- Set and assess coursework
- Set and assess the final examination

Course Assessment

- *Continuous Assessment: Term Paper and oral presentations*

Grading

A 75% - 100%
B 65% - 74%
C 50% - 64%
F below 50% (Fail

Lecturers:

Christopher Moturi moturi@uonbi.ac.ke
Lawrence Muchemi lmuchemi@uonbi.ac.ke
Eric Ayienga ayienga@uonbi.ac.ke