



Computing & Information Sciences



College of Computing & Information Sciences

Computer and Information Technology have revolutionized the way organizations conduct their business and have created a huge demand for computer experts with multi-disciplinary orientation.

College of Computing and Information Sciences [CoCIS] takes pride in announcing that more than 90% of our students start working in industry even before getting the degree.

| | |
|---|---|
| <p>NCEAC accreditation</p>  <p>NCEAC National Computing Education Accreditation Council</p> | <p>Congratulations</p> <p>BSCS program is accredited by National computing Education Accreditation council (NCEAC) of HEC.</p> |
|---|---|

Although CoCIS offers a wide range of programs designed to meet industry requirements. Factors that differentiate us from any other university offering Computer Science and related programs include following:

- Research-intensive separate and industry oriented MS programs
- Project-intensive BS programs that include projects in each course as well as two individual industry-based final year projects
- Innovative BS curricula that include latest tools and technologies that have increased the market acceptability of our graduates enormously
- Rigorously monitored academic programs to ensure the continuous quality improvement

Programs offered by CoCIS

| Bachelor Programs | |
|---|--|
| BS Computer Science | Eligibility: Intermediate with minimum 50% marks, A Levels or equivalent |
| BS Enterprise Resource Planning | |
| Masters (Conversion) Programs | |
| MCS – Computer Science | Eligibility: 2 years bachelor degree with minimum 2nd Division |
| PGD– Enterprise Resource Planning | |
| MSc – Enterprise Resource Planning | |
| MS Programs | |
| MS Computer Science* | Eligibility: 4 Years University Education, Overall 16 Years Education |
| MS Software Engineering* | |
| PhD Program | |
| PhD Computer Science* | Eligibility: 6 Years University Education, Overall 18 Years Education |

*Details of Ph.D. and MS programs are given in the area of “Graduate School of Science and Engineering (GSSE)”



Bachelor and Master Programs in Computer Science [BSCS, MCS] enable the graduates to fulfill job market requirements in the software industry. We are in close coordination with software industry and offer market based elective courses in areas such as Mobile Application Development, Web Engineering, Content Management Systems, Game Development, Cloud Computing etc. There are numerous career opportunities in the industry for our graduates that include but are not limited to Software Engineer, System Analyst, Database Administrator and Project Managers.

BS, PGD and MSc Programs in Enterprise Resource Planning [BS-ERP, PGD-ERP, MSc-ERP] are designed to integrate the area of Computer Sciences and Management Sciences with more than 10 hands-on Enterprise Resource Planning courses using leading ERP solution such as SAP, Oracle and Microsoft Dynamics. Students acquire the right blend of managerial skills coupled with the hands on experience of implementing and managing ERPs in areas, such as finance, manufacturing & production, sales & marketing, human resource etc.

CoCIS Students Market Acceptability

Over 90% of our students start working in the industry even before getting the degree. They do not have to search for jobs as our strong internship program and industry focused final projects enable them to impress the prospective employers long before their graduation.

Graduates from College of Computing & Information Sciences take up challenging careers in software houses, networking solution providers, telecom companies, internet service providers, ERP Consultancy Firms and I.T. departments of public and private sector companies including multinationals and banks.

Research Areas & Respective Supervisors

A dedicated team of qualified researchers including six foreign qualified Ph.Ds are teaching and supervising research in diverse and upcoming areas of technology. Given are the details of the research areas and their respective supervisors:

| Research Area | Supervisor |
|---|--------------------------|
| Machine Learning/Data Sciences | Mr. Sohail Imran |
| Parallel & distributed Computing | Dr. Ayaz ul Hassan |
| Computer Networks / Data Mining | Dr. M. Kamran Nishat |
| Internet of things / Persuasive computing | Dr. Muhammad Taha Jilani |
| Information Security | Dr. Maaz Bin Ahmed |
| Image and Pattern Recognition | Dr. Affan Alim |
| Software Architecture & Design | Mr. Ayub Latif |
| Block chain and Distributed Cloud | Dr. Muhammad Khalid Khan |
| Evolutionary Computing | Dr. Salman Ahmed |

CoCIS Research & Publications

College of Computing & Information Sciences takes pride in claiming that students and faculty of graduate program have published more than 150 international and national papers in national and international journals and conferences:

| Year | No. of Publications |
|---------|---------------------|
| 2019-20 | 30 |
| 2018-19 | 40 |
| 2017-18 | 22 |
| 2016-17 | 15 |
| 2015-16 | 16 |
| 2014-15 | 12 |
| 2013-14 | 10 |
| 2012-13 | 19 |
| 2011-12 | 22 |
| 2010-11 | 17 |
| 2009-10 | 18 |
| 2008-09 | 20 |
| 2007-08 | 25 |
| 2006-07 | 17 |
| 2005-06 | 12 |

CoCIS Industrial Projects & Project Exhibition

Project exhibition is a regular activity that takes place every semester. Students are assigned projects in all the courses and are asked to exhibit their work by the end of semester. Handsome prize money is awarded to the students every semester in the project exhibition.

Apart from the course project, students are required to take final year industry project. Until now, students have under taken over 977 such projects for 534 organizations:

Industry Based Final Year Projects

| Year | No. of Projects | No. of Organizations |
|-----------|-----------------|----------------------|
| 2019-20 | 164 | 30 |
| 2018 - 19 | 134 | 63 |
| 2017 - 18 | 95 | 51 |
| 2016 - 17 | 80 | 44 |
| 2015 - 16 | 103 | 30 |
| 2014 - 15 | 83 | 21 |
| 2013 - 14 | 67 | 17 |
| 2012 - 13 | 44 | 25 |
| 2011 - 12 | 30 | 15 |
| 2010 - 11 | 28 | 13 |
| 2009 - 10 | 21 | 9 |
| 2008 - 09 | 64 | 51 |
| 2007 - 08 | 88 | 81 |
| 2006 - 07 | 140 | 72 |
| 2005 - 06 | 160 | 81 |
| 2004 - 05 | 124 | 62 |
| 2003 - 04 | 127 | 69 |

CoCIS Mentoring Groups

At the time of admission, every student is assigned a mentor (faculty member) for the entire duration of his/her program of studies at KIET. The assigned faculty members hold a mentoring session on fortnightly basis with their group of students. The aim of the mentoring sessions is to provide mentoring, help, guidance and support to our students. The role of the mentor is to monitor the academic progress of his wards, guide, support and help the weak students which results in boosting the morale of weak students.

CoCIS Student Counseling Session

This exercise is mostly related to the students of first year. The first semester students have to meet the counselor every week whereas second semester students are required to attend counseling session once in two weeks. The role of the counselor is to provide one window operations to the new students. He is responsible to take the students queries to the respective department and get them resolved.



KIET Team to Represented Pakistan at International Collegiate Programming Contest World Final in Beijing, China

A two-day “International Collegiate Programming Contest (ICPC)” West Asia Region was held at Lahore under the auspices of Association for Computing Machinery (ACM) which is headquartered at Baylor University, Texas.

More than 80 teams participated, including students of College of Computing & Information Sciences, Karachi Institute of Economics & Technology (KIET).

The overall top performance trophy of “ICPC 2017” was awarded to KIET along with 2 Gold Medals and 3 Shields. Team “Binary01” seen here with President KIET, has been selected to represent Pakistan in ICPC World Final in Beijing, China.



CoCIS Star Performers

CoCIS encourages students to participate in all the competitions held at various universities and fund their expenses. Student societies hold regular technical sessions and internal competitions for the preparation of such events. Following table summarises the performance of our students in the last four years:

| University | Event | Competition | Position |
|-----------------------------|--|---|--|
| Fast University, Karachi | Procom 2019 | Bilingual Debate Competition | 3rd Position |
| Capital University, Isb | Excite Cup 2019 | Software Project Exhibition | 3rd Position |
| IBA, Karachi | Probattle 2019 | Speed Programming | Runner Up |
| Sindh Madarsatul Islam | Imagine Cup 2019 | Project Exhibition | Select for Final Exhibition held in HEC headquarter islamabad |
| Fast Univeristy, Faisalabad | Daira 2019 | Speed Programming, Gaming, Debat | Runner up in some Competition |
| NU Fast, Karachi | PROCOM 2018 | Networking Competition | Winner |
| NU Fast, Karachi | PROCOM 2018 | Project Exhibition | Winner |
| NU Fast, Karachi | PROCOM 2018 | Graphic Design, Speed Programming, Mobile App Development, Network Design | Runner Up |
| IBA, Karachi | ProBattle 2018 | Project Exhibition | Winner |
| IBA, Karachi | ProBattle 2018 | Speed Programming, Data Analysis, Network Design | Runner up |
| UMT, Lahore | ACM ICPC 2017 | International Collegiate Programming Contest | Secure 1st& 10th Position out of 97 teams from all Pakistan. Also won 2 Fastest Problem Solver Gold medal. And qualify for ICPC World Final. |
| UoK, Karachi | Karachi University Leadership Conference (KULC) 2017 | Students perform different activities and Competition related to Team Work, Leadership & Personal Development | PAF KIET students got outstanding performance nomination. 200+ participants Students from 20+ Institutes |
| IoBM, Karachi | Zenith Leadership and Development Conference Karachi- 2017 | Unlock game, Ice-Breaker, Ad-Making, Cleaning Activity, Bridging, Indoor Activity | Won Best Team Award out of 20+ Teams |

Two day conference

“3rd International Conference on Computing & Information Sciences – ICCIS 2019”

College of Computing & Information Sciences (CoCIS) successfully organized 3rd International Conference on Computing & Information Sciences [ICCIS-2019] at Karachi Institute of Economics & Technology, Main Campus on 3 & 4 April, 2019.

The aim of ICCIS-2019 was to provide a forum to present new research and share results of the emerging technologies in the fields of computing and information sciences.

The National and International keynote speakers included Facebook Technical Program Manager Mr. Mohammad Vakil from USA, Bahrain University’s Professor Dr. Nasser Metwally from Bahrain, Habib University Associate Dean Dr. Mohammad Shahid Shaikh, FAST University Dean Dr. Muhammad Atif Tahir and Muhammad



Ali Jinnah University President Dr. Zubair A Shaikh.

More than 20 universities from across the country participated in the conference including Karachi’s FUUAST, NED University, Sir Syed University and Jinnah University for Women, UMT Lahore, PMAS Arid Agriculture University, Rawalpindi, National College of Business Administration and Economics, Rahim Yar Khan FAST-NUCES, Islamabad, Quaid-e-Azam College of Engineering and Technology and COMSAT, Sahiwal.

A total of 72 research paper abstracts were submitted in the two-day conference of which, 20 papers were selected for the final presentation.

In his opening address, KIET President Air Vice Marshal (Retd) Tubrez Asif said he was confident that the forum would help provide a bridge between the academia and the industry. He said that the quality papers were presented and the plenary sessions were educative and brought forth new ideas and information.



Sindh Higher Education Commission Universities and Boards Department Secretary Mr. Muhammad Riazuddin was the chief guest of Opening Ceremony. He expressing keen interest in the conference appreciated the efforts of the researchers and students.

The Chief Guest of the conference closing ceremony was Dr. Shariq Khoja (CEO, Tech4life). He Appreciate the efforts of KIET for providing the platform to the students, faculty and researches.

The Event was closed by Chair, Technical Program Committee Dr. Salman Ahmed Khan. He thanked all the Guest, Keynote Speakers, Participant and he appreciates the efforts of organizing committee and Technical committee for the successful conference.



CoCIS Student Societies

KIET-ACM

CoCIS faculty and students have established KIET's ACM Student Chapter. This society is responsible to bring various Workshops, Competitions and Events for the CS students. Such activities not only increase the interest of the students in the computing discipline but also introduce them to the latest developments in the field of Information Technology. It has open door to the latest research in the field of computing and information technology through the access of ACM Digital Library, ACM Career News and ACM Tech News. Students also become eligible for massive discounts on all ACM Competitions, Workshops, Seminars and Conferences.

COMBAT - The Computing Battle

College of Computing and Information Sciences also host a regular annual event named COMBAT. This is a national level event in which universities from across the country participate in various competitions. The First COMBAT was held in 2009. Since then, the event has come a long way and every time more competitions and excitement is added.

CODE JAM

As the first activity, KIET's ACM Student Chapter arranged the Inter Campus Speed Programming Competition 'CODE JAM'. This was an effort to strengthen the programming skills of students and give them a chance to compete with their fellows.



Alumni Dinner

KIET successfully hosted Cras Stellae Alumni Dinner 2017 at "THE VENUE Askari-IV" on April 01, 2017. The purpose was to arrange a get together for alumni so that they may renew their ties with the Institute and get the opportunity to relive their memories. It was also intended as a farewell dinner for the current passing out students and to wish them luck in future endeavors.

The evening started off with recitation of the Holy Quran followed by the MoC's welcoming speech. Junior students presented multiple dramas and skits, demonstrating the life of university students. These were followed by mimicry and funny title awards to the notable students. Alumni and guests thoroughly enjoyed the event.

The Chief Guest was a senior computer science professional Mr. Badar Sami who is also the ex-HoD of UBIT at KU. Director CoCIS, Dr. Muhammad Khalid Khan thanked the chief guest, alumni and the organizing team in his address. He discussed his 10 years journey with KIET and informed the audience about CoCIS future plans.

The event attracted more than 150 alumni who were photographed and entertained. There were even some alumni from 2004 who came specially to celebrate their successes with the university. Alumni left the event with great memories and a strong anticipation for events of this kind in the future. The event ended with a grand ambassadorial dinner.



ComBat'19 - The Computing Battle held on 11th & 12th April, 2019

On 11th & 12th of April, 2019 the College of Computing and Information Science(CoCIS) of Karachi Institute of Economic and Technology (KIET) organized the flagship event Combat 2019.

College of Computing and Information Sciences host a regular annual event named COMBAT. This is a national level event in which students from universities countrywide participate in various competitions. The first COMBAT was held in 2009. Since then, the event has come a long way.

The year event ComBat'19 (The Computing Battle) event featured 27 competitions of Software Engineering, Computer Networks, Databases, Web and Mobile Applications, Graphic Designing, Electronics, and Computer Gaming. The aim of the event was to bring out the abilities of the students and to provide them a platform for the competition to foster their expertise in the field of IT and related discipline. Cash prizes were awarded to the winners of competitions.



The Combat19 was started by ribbon cutting ceremony followed by opening remarks of patron Combat'19 Mr. Sohail Imran. The students were too excited for the competition and have inquired about starting of the competition even before the start of the opening ceremony.

The event attracted more than 1000 participants from all major universities of Pakistan that includes Institute of Business

Administration (IBA), Karachi, NED University of Engineering and Technology, FAST National University, University of Karachi (KU), Sir Syed University of Engineering and Technology (SSUET), Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology (SZABIST), Bahria University, Mohammad Ali Jinnah University(MAJU), Institute of Business & Technology (Biztek), Iqra University (IU), Usman Institute of Technology (UIT), Federal Urdu University, Sindh Madressatul Islam University, DHA Suffa University.

The event also comprised of several guest speaking sessions on "Algorithm", "The Role of Women in Tech" and "IoT", conducted by Mr. Muhammad Mustaqeem, Ms. Anum Kamran and Syed Umaid Ahmed respectively. In addition to this "Big Data", "SAP as a Career" and "Entrepreneurship" were also the topic of other speakers.

The event Combat'19 brought some new version of competitions to test logical, interactive, innovative, creative and mathematical skills of the students.

At the middle of the day, a theater show named "Mehfil e Chhoru" was played for the participants. The play was highly enjoyed by the attendees.



Research and Publications

Some of the recent research and publications of the faculty and students of the College of Computing & Information Sciences are given below:

| Name of Author | Title of paper | Name of Journal with Details of Publications |
|------------------------------|---|---|
| Salman Ahmed Khan | Goal Programming-Based Two-Tier Multi-Criteria Decision-Making Approach for Wind Turbine Selection | Applied Artificial Intelligence, Volume 33, Issue 1 (2019) |
| Maaz Bin Ahmed | Implementation of Insider Threat Detection System Using Honeypot Based Sensors and Threat Analytics | Future of Information and Communication Conference (2019) |
| Muhammad Taha Jilani | Skin depth verification of the electromagnetic waves for hydrocarbon detection | International Journal of Applied Electromagnetics and Mechanics 2019 |
| Faraz Idris Khan | Understanding Security Requirements and Challenges in Internet of Things (IoT): A Review | Journal Comp. Netw. and Communications (2019) |
| Abdul Wahab Khan | Achieving High Availability in Cloud through Live Migration | KIET Journal of Computing & Information Sciences Volume 2 Issue 1 Jan – June 2019 |
| Shah Muhammad Emaduddin | Robust Feature Extraction Techniques in Speech Recognition: A Comparative Analysis | International Conference on Computing & Information Sciences 2019 |
| Sohail Imran | Mining Diagnostic Investigation Process Technology and Management Engineering (2019) | International Conference on Future Information |
| Hira Beenish | Efficient V2G Model on Smart Grid Vehicles Using AI | IEEE GPECOM 2019 |
| Hira Beenish, Muhammad Fahad | 5G A Review on Existing Technologies | iCOMET 2019 |
| Hira Beenish | Design and Implementation of an android app controlled Fire Fighting Robot | IEEC-2019 Ned University Engineering & technology |
| Hira Beenish | Improving Descriptive Writing Through Modeling At Middle Level | Book Chapter https://www.morebooks.shop/bookprice_offer_b4534a2df422abdf365a3ab66e05ac476b04aec7 2019 |
| Afshan Saad | Cloud computing A paradigm of more insider threats | International Conference on Computing System Engineering 2019 |
| Afshan Saad | Comparison of Manual testing and automation testing. | ICSOFT 2019 |
| Afshan Saad | Assistive Technology In HCI benefit | Women in Software Engineering @ the 13th European Conference on Software Architecture (ECSA 2019) and the 23rd Systems and Software Product Line Conference (SPLC 2019) |

| Name of Author | Title of paper | Name of Journal with Details of Publications |
|---------------------------------------|--|--|
| Salman Ahmed Khan | Application of swarm intelligence algorithms to multi-objective distributed local area network topology design problem | Book chapter in "Swarm Intelligence - Volume 3" by prestigious IET (2018) |
| Muhammad Khalid Khan | Information Processing in EventWeb through Detection and Analysis of Connections between Events | International Journal of Advanced Computer Science and Applications 2018 |
| Muhammad Khalid Khan | Cluster Analysis of Pakistani Terrorism Events to Support Counterterrorism | Societies 2018 |
| Mohammad Affan Alim | The most discriminant sub bands for face recognition: A novel information-theoretic framework | International Journal of Wavelets, Multiresolution and Information Processing (2018) |
| Muhammad Taha Jilani | Effects of defected ground structure slot tuning on frequency and circuit parameters of bandpass filter | Journal of Optoelectronics and Advanced Materials (2018) |
| M. Taha. Jilani et.al | An Implementation of IoT-based Microwave Sensing System | Microelectronics Journal 2018, ISI indexed, JCR Impact factor: 1.163 |
| Muhammad Taha Jilani | An Integrated System for the Issuance of e-Passports | 7th International Conference on Advances in Computing, Electronics and Communication- ACEC2018 |
| Hira Anwar Khan | Usability Evaluation Methods for Jurassic Carnival | In Proceedings of 3rd International Conference on Recent Trends in Computer Science and Electronics, Thailand (2018) |
| Hira Anwar Khan | Usability Evaluation Method through SUS Analysis for Coin Party | International Journal of Pure and Applied Mathematics Volume 118 No. 9 2018, 171-181 |
| Shah Muhammad Emaduddin | Multi-Class Emotion Detection (MCED) using Textual Analysis | International Journal of Advanced Computer Science and Applications 2018 |
| Muhammad Naveed | Performance Evaluation of Unmanned Aerial Vehicles for Video based Surveillance Application | KIET Journal of Computing And Information Science, vol 1, issue 1, July-Dec 2018. |
| Shah Muhammad Emaduddin, Hira Beenish | A Survey on Data Prioritization Algorithms in BAN | Journal of Wireless Personal Communication (2018) |
| Muhammad Ayub Latif, Kashif Bashir | Practices for Achieving Accuracy in Software Costing and Estimation | KIET JOURNAL OF COMPUTING AND INFORMATION SCIENCES, vol 1, issue 1, July-Dec 2018. |
| Hira Beenish | ROLE OF ICT IN FOSTERING THE PERFORMANCE OF EDUCATION SECTOR OF AFRICA | Research Article in EAI International Conference for Research, Innovation and Development for Africa 2018 |
| Hira Beenish | The Role of SEO Techniques to Enhanced Performance and Improved Ranking for Intelli-Web Shop | International Conference on Computing & Information Sciences (2018) |

| Name of Author | Title of paper | Name of Journal with Details of Publications |
|--|--|---|
| M. Taha. Jilani et.al | Pilot-Based Time Domain SNR Estimation for Broadcasting OFDM Systems | Journal of Computer Networks and Communications 2018 |
| Maaz Bin Ahmad, M. Asif, Imtiaz A Taj, Muhammad Tahir | A Generalized Multi-Layer Framework for Video Coding to Select Prediction Parameters | IEEE Access, 2018 |
| M. Taha. Jilani et.al | Enhanced Security Mechanism for Emerging Home Area Networks | The International Conference on Information Technologies, Kaunas (2018) |
| Maaz Bin Ahmad, Iftikhar ul Sami, Muhammad Asif, Rafi Ullah | DoS/DDoS Detection for E-Healthcare in Internet of Things | International Journal Of Advanced Computer Science And Applications, Vol 9, issue 1, 2018 |
| Muhammad Fahad | Heart Diseases Prediction using Data Mining and its Techniques- A Survey | International Conference on Computing & Information Sciences 2018 |
| Maaz Bin Ahmed, Rafi Ullah, Syed Ali Hassan, M. Asif | Prediction type decision for advanced video coding: A machine learning approach | Sci.Int.(Lahore) (2017) |
| Maaz Bin Ahmad, Syed Ali Hassan, Imran Ul Haq, M. Asif, Moeen Tayyab | An Efficient Scheme for Real-time Information Storage and Retrieval Systems: A Hybrid Approach | International Journal of Advanced Computer Science and Applications, Vol.8, issue 8, pp-427-431. 2017 |
| Muhammad Khalid Khan, Muhammad Taha Jilani, Maaz Bin Ahmed, Muhammad Ahmed | Agent-based Architecture For Enterprise-wideData Integration | Sci.Int.(Lahore),29(1),107-111,2017 |
| Muhammad Taha Jilani, Muhammad Khalid Khan, Maaz Bin Ahmed, Mobeen Khan, | A security framework for wireless body area network based smart healthcare system | International Conference for Young Researchers in Informatics, Mathematics and Engineering, CEUR-WS Press.pp.80-85, 2017 |
| Khurum Nazir Junejo | Distribution Shift Resilient Discrimination Information Space for SVM Classification | The 8th IEEE Annual Information Technology, Electronics and Mobile Communication Conference (2017) IEEE |
| M. Taha. Jilani , A. M. Khan, V. Jeoti | Noise Power Estimation for Broadcasting OFDM Systems | 30th IEEE Canadian Conference on Electrical and Computer Engineering (IEEE CCECE 2017), Windsor, Ontario, Canada |
| Khurum Nazir Junejo, Iftikhar ul Sami | Predicting Future Gold Rates using Machine Learning Approach | International Journal of Advanced Computer Science and Applications (IJACSA) (2017) The Science and Information (SAI) Organization (Volume 8 – Number 12) 2017 |
| M. Taha. Jilani, S Rizvi, A Aziz, N Armi, G Muhammad, SH Butt | An investigation of energy efficiency in 5G wireless networks | IEEE International Conference on Circuits, System and Simulation (ICCS 2017), London, UK, 2017 |

| Name of Author | Title of paper | Name of Journal with Details of Publications |
|---|---|--|
| Muhammad Yaseen Khan, Khurum Nazir Junejo, Shah Muhammad Emaduddin, | Harnessing English Sentiment Lexicons for Polarity Detection in Urdu Tweets: A Baseline Approach | 11th International Conference on Semantic Computing 2017 (IEEE) |
| Muhammad Taha Jilani, Muhammad Khalid Khan, Asad Abbas | Comparative Analysis Of Wireless Technologies For Internet-of-Things Based Smart Farm Science International | Journal, ISI Indexed, HEC-recognized, 2017 |
| Muhammad Khalid Khan, et. al. | Using Predictive Analytics for Predicting Host Availability in Desktop Grids | Volume 10, Issue 1 (2017), Page 245 – 254, International Journal of Grid and Distributed Computing. (ISI Indexed) |
| Muhammad Khalid Khan, et. al. | Scheduling in Desktop Grid Systems: Theoretical Evaluation of Policies and Frameworks | Volume 8, Issue 1 (2017), Page 119 – 127, International Journal of Advanced Computer Science and Applications. (ISI Indexed) |
| M. Taha. Jilani | A Security Framework for Wireless Body Area Network based Smart Healthcare System | Joint International Conference on Information Technologies, Kaunas, Lithuania, 2017 (accepted) |
| M. Asif, Maaz Bin Ahmad, Rafiullah and Syed Ali Hassan | Prediction Type Decision For Advanced Video Coding | A Machine Learning approach. Sci.Int., 29(1), 59-63, 2017. (ISI indexed) |
| M. Taha. Jilani | Noise Power Estimation for Broadcasting OFDM Systems | 30th IEEE Canadian Conference on Electrical and Computer Engineering (IEEE CCECE 2017), Windsor, Ontario, Canada (accepted) |
| Muhammad Khalid Khan, et. al. | A Group based Fault Tolerant Scheduling Mechanism to Improve the Application Turnaround Time on Desktop Grids | Volume 13, Issue 2 (2016), Page 274-280, International Arab Journal of Information Technology. (Impact Factor: 0.582) |
| M. Taha. Jilani | A Cyclic Correlation-Based Time Domain Channel Estimation Scheme. | IEEE 6th International Conference on Intelligent and Advanced Systems (ICIAS), Malaysia, 2016. |
| Muhammad Khalid Khan, Danish Faiz | Evaluating the Impact of Client based CPU Scheduling Policies on the Application's Performance in Desktop Grid Systems | Volume 16, Issue 12 (2016), Page 144-148, International Journal of Computer Science and Network Security. (ISI Indexed) |
| Muhammad Taha Jilani | Non-destructive characterization of dielectric materials by microwave spectroscopy in LS band | J. Optoelectron. Adv. M., 18(5-6), 587-592, 2016 (IF = 0.383) |
| Muhammad Asif, Imtiaz A.Taj, S.M Ziauddin, Maaz Bin Ahmad and Atif Raza | An efficient inter prediction mode selection scheme for advanced video coding based on motion homogeneity and residual complexity | IEEJ Transactions on Electrical and Electronic Engineering, 2016 (I.F 0.212). |
| Maaz Bin Ahmad, M. Fahad Abdul Wahab Khan, M. Asif | Toward Securing Medical Document from Insider Attacks | Int'l Journal of Advanced Computer Science and Applications (IJACSA), 2016. (ISI Indexed). |

Guest Speaker Sessions

Some of the recent Guest Speaker Sessions held at College of Computing & Information Sciences are given below:

| Topic | Guest Name | Designation | Organization |
|---|-------------------|-------------------------|-----------------------------|
| SQL Injection & Prevention | Hassan Ali | Manager Software | Jubilee Life |
| Arrays / Game Development | Waqar | Software Engineer | HOM |
| Machine Learning Model Evaluation for Real World Problems | Owais Ahmed | Team Lead | Interactive Health Solution |
| Agile Project Development | Raja Muhammad | Senior Project Manager | Bank Al-Habib Ltd. |
| Making Image Using Arrays of thermal sensors | Usama Ayub | Lecturer | NED University |
| Use of Discrete Mathematics in Software Engineering | S. Imad UR Rehman | SQA Analyst | Contour Software |
| Talk on Career Guidance | Javed Akbar | Director | Engro Corp |
| Pillars of TE, Methods | Muhammad Kamran | SQA Analyst & Team Lead | Contour Software |
| Pillars of OOP | Zain Farooq | Technical Consultant | KE |
| PLD & Intro to VHDL Programming | Muhammad Zeeshan | Research Associate | ICT RnD |
| Building World Class Technologies | Naresh Kumar | Cloud Network Analysis | QuickStart |
| Emerging Technologies in DS | Bilal Tasneem | Manager | UBL |

Bachelor of Science in Computer Science (BS-CS)

Rapid growth of I.T. infrastructure in local and foreign organizations has increased the demand for computer professionals. Specialization can be done through 5 elective courses in selected area. The program meets the HEC and international standards for a full-length 4-year bachelor's degree.

| YEAR -1 | | CR-H |
|---------|--|------|
| CS102 | Programming Fundamentals | 3+1 |
| CS101 | Introduction to Info. & Communication Technologies | 2+1 |
| SS313 | Pakistan and Islamic Studies | 3+0 |
| MKT417 | Visionary Leadership & Motivation | 2+0 |
| QT104 | Algebra & Trigonometry | 3+0 |
| COM131 | English-I (Proficiency Development) | 3+0 |
| MAN102 | Principles of Management | 3+0 |
| SE201 | Object Oriented Programming | 3+1 |
| CE101 | Basic Electronics | 2+1 |
| ACT103 | Financial Accounting | 3+0 |

| YEAR -2 | | CR-H |
|---------|---|------|
| QT104 | Calculus & Analytical Geometry | 3+0 |
| COM132 | English-II (Public Speaking) | 3+0 |
| CE201 | Digital Logic & Design | 2+1 |
| CS102 | Data Structures & Algorithms | 2+1 |
| QT106 | Discrete Mathematics | 3+0 |
| COM233 | English-III (Official Communication) | 3+0 |
| QT105 | Differential Equations & Multivariable Calculus | 3+0 |
| CS202 | Operating Systems | 3+1 |
| CE204 | Computer Organization & Assembly Language | 2+1 |
| CS201 | Database Management Systems | 3+1 |

| YEAR -3 | | CR-H |
|---------|-----------------------------------|------|
| QT303 | Numerical Computing | 2+1 |
| NW301 | Data Communication and Networks | 2+1 |
| CS301 | Computer Architecture | 2+1 |
| MKT423 | Technology Entrepreneurship | 3+0 |
| NW305 | Internet & Intranet Architecture | 2+1 |
| QT203 | Probability & Statistics | 3+0 |
| NW302 | Network Programming | 3+0 |
| SE405 | Object Oriented Analysis & Design | 3+0 |
| IS404 | Parallel & Distributed Computing | 3+0 |
| CS203 | Automata Theory | 3+0 |
| IPT307 | Internship-I | 1+0 |
| IPT693 | Final Project-I | 3+0 |

| YEAR -4 | | CR-H |
|---------|--------------------------------|------|
| SE410 | Design & Patterns | 3+0 |
| CS204 | Human Computer Interaction | 3+0 |
| CS402 | Artificial Intelligence | 3+0 |
| SE302 | Software Engineering | 3+0 |
| ELE | Elective-1 | 3+0 |
| ELE | Elective-2 | 3+0 |
| CS401 | Compiler Construction | 3+0 |
| CS400 | Design & Analysis of Algorithm | 3+0 |
| WN401 | Cryptography | 3+0 |
| IPT407 | Internship-II | 1+0 |
| IPT695 | Final Project-II | 3+0 |

| Curriculum Structure | | | |
|-------------------------|-------|-----------------|-------|
| Area | Cr Hr | Area | Cr Hr |
| Computer Science | 34 | Networks | 09 |
| Software Engineering | 30 | Social Sciences | 15 |
| Quantitative | 17 | Management | 03 |
| Computer Engineering | 06 | Internship | 02 |
| Accounting & Finance | 03 | Project | 06 |
| Information Systems/ERP | 03 | Sports | 04 |

| Degree Structure | |
|---------------------|--|
| Durations | : 4 Years |
| Courses | : 39 |
| Projects | : 2 |
| Internships | : 2 |
| Sports | : 4 |
| Course Cr. Hrs. | : 120 + 6 + 2 + 4 |
| Eligibility: | : Intermediate 50% minimum, A Levels or equivalent |

Location: Main Campus and North Nazimabad Campus

| Comprehensive exam is a mandatory requirement.

Bachelor of Science - Enterprise Resource Planning (BS-ERP)

BS-ERP program is a merger of computer science and management science studies with the focus over next generation Management Information Systems (MIS) also known as Enterprise Resource Planning (ERP) Systems. Students will acquire technical skills for implementing and managing information systems in areas such as finance, economics, management and accounts. Students are prepared to be a Techno Functional consultant of the leading ERP system.

| YEAR -1 | | CR-H |
|------------------------------------|--|------|
| Visionary Leadership & Motivation | | 1 |
| ERP Fundamentals | | 3 |
| Principles of Management | | 3 |
| Pakistan & Islamic Studies | | 3 |
| Financial Accounting | | 3 |
| Advanced Business Mathematics | | 3 |
| Programming Fundamentals | | 4 |
| English-I (Proficiency) | | 3 |
| ERP Computing Infrastructure | | 3 |
| English-II (Written Communication) | | 3 |
| Cost and Managerial Accounting | | 3 |

| YEAR -2 | | CR-H |
|---|--|------|
| Object Oriented Programming | | 4 |
| ERP Communication Infrastructure | | 3 |
| Principles of Marketing | | 3 |
| Introduction to Business Finance | | 3 |
| ERP Business Process Management & Reengineering | | 3 |
| Database Management System | | 4 |
| ERP Application Analysis & Design | | 3 |
| English-III (Public Speaking) | | 3 |
| Securing ERP Systems | | 3 |
| Financial Management | | 3 |

| YEAR -3 | | CR-H |
|--------------------------------------|--|------|
| Marketing Management | | 3 |
| ERP Implementation Methodologies | | 3 |
| ERP Financial Management | | 3 |
| ERP Application Development | | 3 |
| ERP Portal Management | | 3 |
| ERP Customer Relationship Management | | 3 |
| ERP Data Management | | 3 |
| Strategic Management | | 3 |
| ERP Human Resource Management | | 3 |
| ERP Inventory Management | | 3 |

| YEAR -4 | | CR-H |
|-------------------------------------|--|------|
| ERP Sales & Distribution Management | | 3 |
| Auditing ERP Systems | | 3 |
| ERP Mobile Applications | | 3 |
| ERP Production Management | | 3 |
| Elective-1 | | 3 |
| Elective-2 | | 3 |
| Elective-3 | | 3 |
| Elective-4 | | 3 |
| Final Project-I | | 3 |
| Final Project-II | | 3 |

| Curriculum Structure | | | |
|--|-------|-----------------|-------|
| Area | Cr Hr | Area | Cr Hr |
| Computer Science & Information Systems | 33 | Management | 9 |
| Accounting & Finance | 17 | Quantitative | 6 |
| Enterprise Resource Planning | 30 | Social Sciences | 14 |
| Marketing | 9 | Internship | 2 |
| | | Project | 6 |

| Degree Structure | |
|--------------------|--|
| Durations | : 4 Years |
| Courses | : 39 |
| Projects | : 2 |
| Internships | : 2 |
| Course Cr. Hrs | : 118 + 6 + 2 |
| Eligibility | : Intermediate 50% minimum, A Levels or equivalent |

Location: City Campus | Comprehensive exam is a mandatory requirement.

Masters in Computer Science (MCS)

Specialization: **Software Engineering**

MCS program provides the necessary foundation and specialization in Software Engineering and Telecom & Networks. Graduates of MCS program are now successful in the industry as IT managers, networks/systems administrators, analysts and software engineers. This is a conversion program designed for students having no Computer Science background. Graduates of MCS program are also eligible to pursue the higher-level MS and PhD degree programs.

| YEAR -1 | | CR-H |
|---------|---|------|
| CS101 | Introduction to Information and Comm. Technologies | 3+0 |
| SE102 | Programming Fundamentals | 3+0 |
| ERP102 | ERP Business Process Management & Re-engineering | 3+0 |
| SE201 | Object Oriented Programming | 3+0 |
| NW427 | Data Communications & Networks | 3+0 |
| ACT201 | Financial Accounting | 3+0 |
| ECR6509 | English-3 Official Communication and Report Writing | 3+0 |
| QT106 | Discrete Mathematics | 3+0 |
| CS201 | Database Management Systems | 3+0 |
| CS202 | Operating Systems | 3+0 |
| CS105 | Data Structures & Algorithms | 3+0 |
| SE405 | Object Oriented Analysis & Design | 3+0 |

| YEAR -2 | | CR-H |
|---------|--|------|
| CS462 | Routing & Switching Techniques | 3+0 |
| NW401 | Cryptography | 3+0 |
| SE417 | Software Engineering & Project Management | |
| CS203 | Automata Theory | 3+0 |
| CS401 | Compiler Construction | 3+0 |
| CS301 | Artificial Intelligence and Expert Systems | 3+0 |
| CS | Design & Analysis of Algorithms | 3+0 |
| ELE | Elective 1 | 3+0 |
| ELE | Elective-2 | 3+0 |
| ELE | Elective-3 | 3+0 |
| IPT414 | Final Project | 6+0 |

| Curriculum Structure | | | |
|----------------------|-------|-----------------|-------|
| Area | Cr Hr | Area | Cr Hr |
| Computer Science | 18 | Networks | 9 |
| Software Engineering | 15 | Social Sciences | 3 |
| Quantitative | 3 | Elective | 12 |
| Accounting | 3 | Project | 6 |
| Info. Systems / ERP | 3 | | |

| Degree Structure | |
|--------------------|-------------------------|
| Durations | : 2 Years |
| Courses | : 22 |
| Projects | : 2 |
| Credit Hours | : 66 + 6 |
| Eligibility | : Bachelors 50% minimum |

Location: City Campus

Comprehensive exam is a mandatory requirement. Student must clear this exam to become eligible for the degree. The curriculum structure, duration and scheduling of each degree program are subject to change without notice.

Incase HEC rules that the minimum credit requirements of a Masters degree after two years bachelors is 90 credit hours then 6 additional courses equivalent 18 credit hours are to be taken by the students for the completion of the degree.

Postgraduate Diploma - Enterprise Resource Planning (PGD-ERP)

The one year PGD-ERP program introduces students to the next generation Management Information Systems (MIS) also known as Enterprise Resource Planning (ERP) Systems. The courses build the foundation of software development skills using latest programming and database platforms. Business knowledge is incorporated through management, accounting and business process engineering courses. ERP systems are introduced with focus on the underlying technologies as well. After completing PGD-ERP program, students can opt for one year MSc-ERP program that will focus on the hands on experience on different ERP modules using leading ERP systems.

| YEAR -1 | CR-H |
|---|------|
| Introduction to Information and Comm. Technologies | 3 |
| Programming Fundamentals | 3 |
| ERP Business Process Management & Reengineering | 3 |
| Object Oriented Programming | 3 |
| ERP Computing Infrastructure | 3 |
| Financial Accounting | 3 |
| English-III (Official Communication & Report Writing) | 3 |
| Database Management Systems | 3 |
| Cost & Managerial Accounting | 3 |
| ERP Communication Infrastructure | 3 |
| ERP Implementation Methodologies | 3 |
| ERP Inventory Management | 3 |

| Curriculum Structure | | | |
|------------------------------|-------|------------------|-------|
| Area | Cr Hr | Area | Cr Hr |
| Enterprise Resource Planning | 21 | Computer Science | 6 |
| Accounting & Finance | 3 | Management | 3 |
| Social Science | 3 | | |

| Degree Structure | |
|--------------------|-------------------------|
| Durations | : 1 Year |
| Courses | : 12 |
| Credit Hours | : 36 |
| Eligibility | : Bachelors 50% minimum |

Location: City Campus

Comprehensive exam is a mandatory requirement. Student must clear this exam to become eligible for the degree. The curriculum structure, duration and scheduling of each degree program are subject to change without notice.

MSc-ERP

MSc-ERP provides students a unique blend of business and next generation Management Information Systems (MIS) also known as Enterprise Resource Planning (ERP) Systems studies. The program is designed to prepare students for a career in management cadre with expertise of utilizing IT for competitive and business advantage. With increasing competition in rapidly growing sectors of economy such as Banking, Telecommunication and FMCG, ERP skills are in great demand.

| YEAR -1 | | CR-H |
|--|--|------|
| Introduction to Information and Comm. Technologies | | 3 |
| Programming Fundamentals | | 3 |
| ERP Business Process Management & Reengineering | | 3 |
| Object Oriented Programming | | 3 |
| ERP Computing Infrastructure | | 3 |
| Financial Accounting | | 3 |
| Functional English | | 3 |
| Database Management Systems | | 3 |
| ERP Communication Infrastructure | | 3 |
| ERP Implementation Methodologies | | 3 |
| ERP Application Analysis & Design | | 3 |
| ERP Inventory Management | | 3 |

| YEAR -2 | | CR-H |
|--------------------------------------|--|------|
| ERP Application Development | | 3 |
| Cost and Managerial Accounting | | 3 |
| ERP Human Resource Management | | 3 |
| ERP Financial Management | | 3 |
| ERP Customer Relationship Management | | 3 |
| ERP Sales & Distribution Management | | 3 |
| ERP Production Management | | 3 |
| Elective 1 | | 3 |
| Elective-2 | | 3 |
| Elective-3 | | 3 |
| Final Year Project I | | 3 |
| Final Year Project II | | 3 |

| Curriculum Structure | | | |
|------------------------------|-------|-----------------|-------|
| Area | Cr Hr | Area | Cr Hr |
| Computer Science | 6 | Social Sciences | 3 |
| Accounting & Finance | 6 | Management | 3 |
| Enterprise Resource Planning | 48 | Project | 6 |

| Degree Structure | |
|--------------------|-------------------------|
| Durations | : 2 Years |
| Courses | : 22 |
| Projects | : 2 |
| Credit Hours | : 66 + 6 |
| Eligibility | : Bachelors 50% minimum |

Location: City Campus

Comprehensive exam is a mandatory requirement. Student must clear this exam to become eligible for the degree. The curriculum structure, duration and scheduling of each degree program are subject to change without notice.

Incase HEC rules that the minimum credit requirements of a Masters degree after two years bachelors is 90 credit hours then 6 additional courses equivalent 18 credit hours are to be taken by the students for the completion of the degree.

Masters of Science- Enterprise Resource Planning (MSc-ERP) (for BS-CS and BBA 4-years)

The one year MSc-ERP program is designed for students who have 16 years of education in Business and want to jump start their careers. ERP hands on experience enables the graduate to become productive from day one of their employment. A global career awaits for individuals with ERP expertise.

| YEAR -1 | | CR-H |
|---|--|------|
| ERP Business Process Management & Reengineering | | 3 |
| ERP Implementation Methodologies | | 3 |
| ERP Inventory Management | | 3 |
| ERP Human Resource Management | | 3 |
| ERP Financial Management | | 3 |
| ERP Customer Relationship Management | | 3 |
| ERP Sales & Distribution Management | | 3 |
| ERP Production Management | | 3 |
| ERP Advance Financial Controls | | 3 |
| Final Year Project I | | 3 |
| Final Year Project II | | 3 |

BBA 4 Years Students have to take five additional courses

Pre-Requisites

Programming Fundamental
Object Oriented Programming

Co-Requisites

Database Management System
ERP Application Analysis and Design
ERP Application Development

Curriculum Structure

| Area | Cr Hr | Area | Cr Hr |
|------------------------------|-------|---------|-------|
| Enterprise Resource Planning | 27 | Project | 6 |

Degree Structure

| | |
|--------------------|----------------------------------|
| Durations | : 1 Year |
| Courses | : 9 |
| Project | : 2 |
| Credit Hours | : 27 + 6 |
| Eligibility | : BS-CS, BBA 4 Yrs or equivalent |

Location: City Campus

Comprehensive exam is a mandatory requirement. Student must clear this exam to become eligible for the degree. The curriculum structure, duration and scheduling of each degree program are subject to change without notice.

Specializations

| Course Code | Course Title | Credit Hours | Pre Req. |
|-----------------------------|---|--------------|----------|
| Software Engineering | | | |
| SE201 | Object Oriented Programming | 4 | CS100 |
| SE210 | Principles of Component Programming | 3 | SE201 |
| SE205 | Business Application Analysis & Design | 3 | CS201 |
| SE301 | Business Software Development | 3 | SE205 |
| SE302 | Object Oriented Analysis & Design | 3 | SE201 |
| SE303 | Web Applications Development | 3 | SE201 |
| SE306 | Advance Java Programming | 3 | CS102 |
| SE304 | Visual Programming | 3 | SE201 |
| SE309 | Data Warehouse & Data Mining | 3 | CS201 |
| SE402 | Software Engineering | 3 | SE302 |
| SE403 | Human Computer Interfaces | 3 | CS402 |
| SE405 | Software Project Management | 3 | SE402 |
| SE406 | Multi-tier Programming | 3 | SE304 |
| SE407 | Advanced Computer Graphics | 3 | CS413 |
| SE408 | Systems Programming | 3 | SE201 |
| SE410 | Design & Patterns | 3 | NW302 |
| SE417 | Software Engineering and Project Management | 3 | SE302 |
| SE450 | Software Design & Production Methodologies | 3 | SE402 |
| SE451 | Pattern Recognition & Applications | 3 | CS402 |
| SE501 | Software Architecture & Design | 3 | SE402 |
| SE502 | Software Quality Assurance | 3 | SE402 |
| SE504 | Object Oriented Software Engineering | 3 | SE402 |
| SE505 | Programming Methodologies & Paradigms | 3 | SE402 |
| SE507 | Multimedia Systems | 3 | SE402 |
| SE555 | System Maintainability & Maintenance | 3 | SE402 |

| Course Code | Course Title | Credit Hours | Pre Req. |
|--|---|--------------|----------|
| Networking & Telecommunications | | | |
| NW301 | Data Communication & Networks | 4 | CS202 |
| NW302 | Network Programming | 3 | NW301 |
| NW304 | Network Administration | 3 | CS202 |
| NW305 | Routing & Switching | 4 | NW301 |
| NW306 | High Speed Networks | 3 | NW301 |
| NW307 | Electronic Communication System | 3 | CE101 |
| NW308 | Wireless Communication | 3 | NW301 |
| NW401 | Cryptography | 3 | NW301 |
| NW408 | Advanced Data Communication & Networks | 3 | NW301 |
| NW409 | Network & Telecom Management | 3 | NW301 |
| NW410 | Network Protocols | 3 | NW301 |
| NW416 | Network Design & Implementation | 3 | NW301 |
| NW422 | Seminar in Networking | 3 | NW301 |
| NW423 | Multi-Service Networks | 3 | NW301 |
| NW430 | Advanced Routing Techniques | 3 | NW305 |
| NW501 | Network Security | 3 | NW401 |
| NW502 | Mobile Communication | 3 | NW301 |
| NW503 | Digital Switches and Exchanges | 3 | NW307 |
| NW509 | Enhanced Wireless Networks | 3 | NW306 |
| NW510 | Internetworking Architecture & Implementation | 3 | NW306 |
| NW530 | Voice Over IP | 3 | NW306 |
| NW540 | Optical Communication Systems | 3 | NW306 |
| NW550 | Telecommunication Architecture & Services | 3 | NW409 |

Specializations

| Course Code | Course Title | Credit Hours | Pre Req. |
|-------------------------------------|---|--------------|----------|
| Enterprise Resource Planning | | | |
| ERP101 | Introduction to MIS & ERP | 3 | None |
| ERP102 | ERP Business Process Management & Reengineering | 3 | None |
| ERP201 | ERP Implementation Methodologies | 3 | ACT201 |
| ERP202 | ERP Communication & Computing Infrastructure | 3 | ERP101 |
| ERP301 | ERP Implementation Consultancy | 3 | ERP201 |
| ERP302 | ERP Financial Management | 3 | ERP201 |
| ERP303 | ERP Customer Relationship Management | 3 | ERP201 |
| ERP306 | Advance Financial Controls | 3 | ERP201 |
| ERP305 | ERP Supply Chain Management | 3 | ERP201 |
| ERP315 | ERP System Administration | 3 | ERP201 |
| ERP412 | ERP Production Systems | 3 | ERP201 |
| ERP414 | ERP Material Management | 3 | ERP201 |
| ERP415 | ERP Business Intelligence | 3 | ERP201 |
| ERP417 | ERP Sale & Distribution Management | 3 | |
| ERP | Security ERP Systems | 3 | |
| ERP | Auditing ERP Systems | 3 | |
| ERP | ERP Mobile Application | 3 | |
| ERP | ERP Portal Management | 3 | |

| Course Code | Course Title | Credit Hours | Pre Req. |
|-------------------------|--|--------------|----------|
| Computer Science | | | |
| CS100 | Programming & Logic Building | 4 | None |
| CS110 | Computer Programming | 4 | None |
| CS101 | Introduction to Computer Science | 3 | None |
| CS102 | Data Structures | 4 | SE201 |
| CS201 | Database Management Systems | 4 | CS202 |
| CS202 | Operating Systems | 4 | CS101 |
| CS203 | Automata Theory | 3 | QT106 |
| CS302 | Distributed Databases | 3 | CS201 |
| CS400 | Design & Analysis of Algorithm | 3 | CS401 |
| CS401 | Compiler Construction | 3 | CS203 |
| CS402 | Artificial Intelligence & Expert Systems | 3 | SE302 |
| CS405 | Neural Networks | 3 | CS402 |
| CS411 | Operation Research | 3 | QT403 |
| CS413 | Computer Graphics | 3 | CS102 |
| CS502 | Advanced Database Mgmt Systems | 3 | CS302 |
| CS508 | Distributed Systems | 3 | CS202 |
| CS509 | Natural Language Processing | 3 | CS402 |
| CS514 | Parallel Computing | 3 | CS302 |
| CS516 | Simulation & Modeling Theory | 3 | QT403 |
| CS531 | Interactive Computer Graphics | 3 | CS413 |

Specializations

| Course Code | Course Title | Credit Hours | Pre Req. |
|-----------------------------|---|--------------|----------|
| Computer Engineering | | | |
| CE101 | Basic Electronics | 3 | None |
| CE201 | Digital Systems | 3 | CE101 |
| CE204 | Computer Architecture & Assembly Language | 3 | CE201 |
| Information Systems | | | |
| IS101 | Accounting Information System | 3 | ACT102 |
| IS201 | Management Information Systems | 3 | CS101 |
| IS302 | E-Commerce Technology | 3 | IS 201 |
| IS304 | Information System Security | 3 | IS 201 |
| IS305 | Info. Sys. Infrastructure Management | 3 | SE405 |
| IS401 | Decision Support Systems | 3 | IS 201 |
| IS403 | Business Process Reengineering | 3 | IS 201 |
| IS404 | Information System Audit & Control | 3 | SE405 |
| IS405 | Business Intelligence | 3 | SE301 |
| IS409 | Strategic Information System | 3 | IS 201 |
| IS431 | Forecasting & Demand Modeling Systems | 3 | ACT102 |

