DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

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– Head of Department

Highlights

Research Output

Within the August 2005 to July 2006 window of this report, the department produced:

Type of Output	Number
Book Chapters	1
Journal Articles	7
Conference Presentations	11
Invited Presentations	3

Student Throughput

This year, 93 students will be graduating with a major offered by the department. The following data provides a breakdown by major (there are 2 students who majored in both Mathematics and Computer Science, which accounts for the total of all the majors earned being 95).

Major	No. of Graduands (1st class honours)
Computer Science	55 (13)
Mathematics	24 (0)
Actuarial Science	13 (4)
Mathematics with Education	3 (0)

Income Generation

The combined net income for the department from Summer School 2006 was just over J$3.1 million, with the bulk of that generated from Mathematics courses. The Mathematics Section also offered a highly subscribed Preliminary Mathematics programme, with at least 150 students registering in each of Semesters I and II. Based on an estimated revenue of $4,000 per credit per student (at 6 credits per course), an estimated 25% of revenue for administrative overheads, and direct teaching expenses of $1,200,000, the Section estimates that its net income from this programme was $4,200,000.

Activities of the Mathematics Section (Section Head: Dr. Raymond McEachin)

During the Academic Year 2005/06, the Mathematics Section introduced a new course for majors, *Introduction to Mathematical Analysis* (M21Q). With this significant step, the Section has initiated a complete revision of its undergraduate course offerings.

During the 2006-07 Academic Year, the Mathematics Section expects to plan and seek approval for a new first-year sequence in mathematics. This will replace the current sequence and is expected to be a major step in its continuing efforts to revise its course offerings. The Section also expects to launch a new summer programme for incoming Faculty students, with a view to preparing them successfully for the rigors of university mathematics courses.

The teaching in the Mathematics Section had average rating of 3.9 (s.d. 0.9) for the instructors and 3.7 (s.d. 1.0) for the courses. The average response rate was 46%.

Activities of the Computer Science Section (Section Head: Dr. Daniel Coore)

From July 1, 2005 to June 30, 2006 the Computer Science Section implemented several initiatives aimed at improving the educational experience of our students, as well as the quality of our academic programmes.

Student Centred Activities

At the start of the academic year, we approximately doubled the number of lab technicians employed to help man the computer labs and assist students in the lab. Some of these laboratory technicians were also given a new role: to act as software developers on a special project to develop

software tools that would enhance the operation of the Section. Many positives have come from this initiative, including: improved coverage of the lab, increased part-time employment opportunities for our students, and, importantly, the capacity to develop Web-based tools for facilitating some of the day-to-day activities in the Section. The students who were employed gained useful experience from the job, and since many of them were second year students, they will provide a degree of continuity in lab technician expertise from one academic year to the next (formerly, all of these lab technicians were third year students).

In this past academic year, we also saw the revival of the Computer Science student club (after being defunct for several years). Under the new name of HACKERS (High Achievers Commanding Knowledge, Enabling Resource Sharing) they have a membership of about 25 students and have identified a number of projects to work on, including running short seminars on specific computing-related skills. They are currently working on a project to construct a "supercomputer" from several de-commissioned computers. The club is dedicated to engaging in activities that will enhance their members' educational experience while at UWI, and that will raise the profile of Computer Science on the campus. To this end, the Section is very pleased to see the successful revival of this group, and is committed to supporting their continued growth and development.

Curricular Updates

Based on recommendations from educators on the most recent IEEE/ACM Joint Task Force on Computing Curricula, the Section reviewed and updated six (6) courses, whose course descriptions had been unchanged for five or more years. These courses, together with those of our recently overhauled undergraduate programme, place heavy emphasis on problem solving and on application of general principles to specific problems, preferably those that are readily appreciated by the students. A number of the reviewed courses have moved away from asking students to give descriptive solutions to problems and now ask them to produce actual implementations of those solutions instead.

An important modification, made two years ago to the new curriculum, was the introduction of a mandatory project course. Students in the old programme were encouraged, but not required, to do this course. About 20 students took the project course in each of the past two Summer sessions (2005, 2006). Although, many students struggled with the task of completing their projects on-time, the (informal) feedback from them after the course was finished was all positive. In general, students

appreciated the sense of accomplishment they had with a completed project, and they cited as the primary benefit from the course, an improved self-confidence in their own programming abilities. Experience gained from the first two offerings has helped to improve delivery and assessment for the upcoming academic year, when the first batch of compulsory students will be enrolled. The project course will be offered in each semester and in the Summer, giving students the flexibility of taking the course whenever they can fit it into their schedule. Money made in Summer School from this course is set aside specifically for student-related matters; for example the prize money for the Dr. Karl Robinson award, given to the top performing final year undergraduate, is taken from this money.

Process Improvement and Efficiency

The Section has developed a computer program to assign students in the Faculty to the various lab (or lecture) streams available within each course in a manner that minimises clashes and reduces the number of students who remain unassigned. The program, developed in academic year 2004/05, was used, for the first time, as the primary tool for allocating students registered in the Faculty. Despite much room for improvement, particularly on its interface and on some of its interactive features, it has produced evenly populated course streams, highlighted capacity problems (i.e. where the number of labs were insufficient to accommodate all of the students registered for the course), and indicated which subjects are incompatible because of timetable clashes. Work continues on the program to address the shortcomings mentioned, yet the program continues to be used to generate lab streams for the Faculty of Pure and Applied Sciences. Other tools have been produced by the Section, but so far for use only by the Section. These include a tool to accept, in electronic format, assignment submissions from students, generating digitally signed receipts in return; and a tool to mark up course description information to produce documents that are suited for different purposes (e.g. one for submitting for approval from Faculty and Academic Boards, another for presentation on the Web, and yet another for reproduction in the Faculty Handbook). Both of these tools, products of the software development project, are still works in progress that we anticipate will eventually be stable enough to be made available to other departments.

The Section has also recognised the need for a formal mechanism for assigning tutors and markers to courses in order to enable the timely return of marked assignments. We have developed a system that assigns tutors

and markers to a course based on registration and on the volume of course work given.

Staff Policy

Over the last academic year, the department had four (4) staff members working part-time on PhD degrees. The Computer Science Section adopted a policy to reduce the major course-load for such persons to two (2) (they have been asked to help with tutorials, as necessary). In January, Dr. Timothy Stitt completed his thesis dissertation, and in July, Dr. Ashley Hamilton-Taylor followed. The other two staff members who are currently pursuing their PhD degrees (Mrs. Gunjan Mansingh and Mrs. Lila Rao) have been making good progress on their research: together they have produced 3 joint (refereed) conference presentations and three (refereed) journal articles. Mrs. Mansingh has produced 1 published article, and another has been accepted for publication; Mrs. Rao-Graham has had one article accepted for publication. We believe that this policy has played an important part in allowing these staff members to progress in their research, and we will endeavour to maintain it to the extent that we are able. A fifth member of the department from the Mathematics Section, Mr. Samuel McDaniel, is pursuing a full-time PhD on leave of absence.

Professional Service

Professor Rodkina serves on the Editorial Board for the I*nternational Journal on Difference Equations and Dynamical Systems.* Dr. Daniel Coore serves as a member of the UCJ IT Board of Studies.

PAPERS PRESENTED

- **Daniel Coore**. 2006. Applications of Amorphous Computing to Information Systems Research. Caribbean Conference on Information Systems. Kingston, Jamaica. June 1-4, 2006.

- **Lila Rao-Graham. 2006.** Incorporating Value/Cost Analysis in the Design of Information and Knowledge Management Systems. Caribbean Conference on Information Systems. Kingston, Jamaica. June 1-4, 2006.

- **Gunjan Mansingh**. 2006. Creating a Knowledge-Manage- ment Infrastructure in Health Sector: A Jamaican Case Study.

Caribbean Conference on Information Systems. Kingston, Jamaica. June 1-4, 2006.

PUBLICATIONS

Book Chapters:

* Muzaki Farida and **Ezra Mugisa.** 2006. Towards Enhancing Learning with Information and Communication Tech- nology in Universities. <u>Information and Communication Technology for Sustainable Develop- ment: Measuring Computing Research Excellence and Vitality,</u> eds. Williams and Baryamureeba. Foundation Publishers, Kampala.

Journal Articles:

* Mansingh A., Harper L., Headley S., King-Mowatt J., **Mansingh G**. 2006. Injuries in West Indies Cricket 2003-2004. *British Journal of Sports Medicine* 40: 119-123.

* **McCloud N**. and **McEachin R,** 2006. A connection between Schur multiplication and Fourier interpolation II. *Mathematische Nachrichten,* 12: 1335 - 1358.

* **Rodkina A.E.** and Basin M.V. 2005. On delay-dependent stability for a class of nonlinear stochastic delay-difference equations. Dynamic of Continuous, Discrete and Impulsive Systems. Series A: Mathematical Analysis. 12: 663-673.

* **Rodkina A.** and Nosov V. 2006. Stability of Stochastic Delay Cubic Equations. *Dynam. Systems Appl.* 15: 193-205.

* Berkolaiko G. and **Rodkina A.** 2006. Almost Sure Convergence of Solutions to Non-Homogeneous Stochastic Difference Equation. *Difference Equations and Applications* 12(6): 535-553.

* Appleby J.A.D., Mao X. and **Rodkina A**. 2006. On stochastic stabilization of difference equations. *Dynamics of Continuous and Discrete Systems*. 3: 843-857.

* Appleby J.A.D., **Rodkina A.** and Schurz H. 2006. Pathwise non-exponential decay rates of solutions of scalar nonlinear stochastic differential equations. *Disc. Con. Dynam. Sys. Ser. B.* 4: 668-696.

Reviewed Conference Presentations:

* Pyne, Richard and **Mugisa, Ezra.** 2006. Retrieving Software Components from a Heterogeneous Repository : A Semantic Syntactic Approach. Proceedings of the 13th Annual IEEE International Symposium and Workshop on Engineering of Computer Based Systems: Mastering Complexity of Computer-Based Systems, eds. Mathias Riebisch, Peter Tabeling and Werner Zorn. 27-30 March 2006, Postdam, Germany, IEEE Computer Society.

* Gayle, Orrett, and **Coore, Daniel**. 2006. Self-organizing Text in an Amorphous Environment. NECSI International Conference on Complex Systems (ICCS 2006). Boston, Massachusetts. June 2006.

* Mills A., **Mansingh G.** and **Rao-Graham L.** 2005. Understanding Individual Preference for Online Service Channels: The Case of Internet Banking. Proceedings of the 4th Workshop on e-business, Las Vegas, U.S.A. Dec 10, pp 49-55.

* **Rao L., Mansingh G.** and Grant G. 2006. A Proposed Framework for Assessing the Factors Influencing the Adoption of Free and Open Source Application Software in Organizations. 17th IRMA International Conference. Washington, D.C. U.S.A. May 21-24.

* Mills A., **Rao L.** and **Mansingh G.** 2006. Understanding the Impact of Innovation Characteristics and Individual Differences on Adoption of Online Channels. 17th IRMA International Conference. Washington, D.C. U.S.A. May 21-24.