Research

OUI faculty members deal in research in varied fields representing the different knowledge areas: Social Sciences, Humanities, Natural Sciences, Exact Sciences and Engineering.

Research Authority Activities

The Research Authority supports research activities by locating external funding sources and assisting in submitting proposals to such external funds, and provides direct support by allocating resources from the internal research fund.

A technology transfer subsidiary at the OUI: This year, we established a subsidiary for technology transfer at the OUI, called "OPMOP" (the Hebrew acronym for Open U – R&D) to address intellectual property resulting from research and work of OUI researchers and employees. Establishing the company will make it possible to realize the commercial potential embodied in the fruits of University activities for the general good.

Handling post-doctoral grants: The management of post-doctoral grants has been transferred to the Research Authority so that the activities of the post-docs are handled in the framework of research at the University.

Grants for new faculty members: The University was able to recruit donations targeted toward research grants for absorbing new senior faculty members. These grants will help them in establishing their research in the initial stages of their work at the OUI, and are conditional on submitting a proposal to a competitive external fund within two years of joining the faculty.

Contacts with national and international research management bodies: As in the past, this year the Director of the OUI Research Authority participated in meetings of the Forum of Research Authority Directors in Universities in Israel. In addition, she was on the committee of the Israel Academy of Sciences that is preparing to establish a national database on research in Israel. A representative of the Research Authority participated in the annual meeting of the European Association of Research Authorities, and at a workshop planning the European Union's Seventh Framework Programme for research and technology development (FP7) in Brussels, with the participation of Israeli Research Authority directors.

Research Grants Awarded by External Funds in 2007-2008

Eleven studies conducted by Open University faculty were awarded funding from external funds this year:

- **Prof. Nurith Gertz** received a grant from the Israel Science Foundation (ISF) for research on "Cultural interrelations: Palestinian, Israeli and European cinema"
- **Dr. Vadim Grinshtein** (with Prof. Felix Abramovich, Tel Aviv University) received a grant from the Israel Science Foundation (ISF) for research on "Maximum a posteriori principle in testing, estimation and model selection"
- **Dr. Michael Langberg** received a grant from the Israel Science Foundation (ISF) for research on "Between Hamming and Shannon: Merging perspectives from the fields of Information Theory and Theoretical Computer Science"
- **Dr. David Lorenz** received a grant from the Israel Science Foundation (ISF) for research on "Enabling multi-extension aspect-oriented software engineering"
- **Dr. Hayah Katz** (with Prof. Avraham Faust, Bar-Ilan University) received a grant from the Israel Science Foundation (ISF) for research on "Tel `Eton and Judah's Southern Trough Valley: A bridge or a barrier"
- **Prof. Shlomo Shoval** received a grant from the Ministry of National Infrastructures for research on "Characteristics of the clay minerals in the sediments of the Dead Sea Group in the Dead Sea Valley"
- **Dr. Manor Mendel** (with Dr. Z. Lotker, Ben-Gurion University of the Negev) received a grant from the Cisco Collaborative Research Initiative (CCRI) for research on "Methods for developing efficient multicore algorithms"
- **Dr. Michael Langberg** (with Prof. David Peleg and Dr. Liam Roditty, Weizmann Institute of Science) received a grant from the Cisco Collaborative Research Initiative (CCRI) for research on "Protocol oblivious (behavioral) Internet traffic classification"

- **Dr. Esther Klein-Wohl** and **Dr. Ingrid Barth** received a grant from the Inter-University Center for E-learning (MEITAL) for research on "Development of Open Learning Resource to support acquisition of discipline-specific academic vocabulary"

- **Dr. Avner Caspi** and **Ina Blau** received a grant from the Israel Internet Association (ISOC-IL) for research on "Whose line is it? The influence of Wiki editing on psychological ownership, perception of learning and its quality"

- **Dr. Irit Back** received a grant from the Minerva Center for Human Rights for research on "The Darfur conflict and the African Union: From non-interference to intervention?"

Two of the studies are described below.

- **Dr. David Lorenz**: "Enabling multi-extension aspect-oriented software engineering"

The problem of code entanglement resulting from crosscutting concerns is ubiquitous in modern software systems. Aspect-oriented programming (AOP) languages are an ideal implementation domain for such designs. Unfortunately, however, general-purpose aspect-oriented extension languages lack the expressiveness to tackle all cases of crosscutting. The research will develop a scientific foundation for enabling multi-extension aspect-oriented software engineering. Dealing with unanticipated crosscutting concerns will be made possible by creating and combining different domain-specific aspect-oriented languages to form new AOP functionality.

- **Dr. Vadim Grinshtein**: "Maximum a posteriori principle in testing, estimation and model selection"

The new challenges arising in analyzing complex high-dimensional data sets of large sizes require novel approaches and techniques for traditional statistical problems. In particular, the Bayesian approach has been proved efficient in tackling such problems. The proposed research intends to investigate a Bayesian approach to multiple testing, estimation and model selection. We consider the maximum a posteriori (MAP) multiple testing procedure of Abramovich and Angelini. The main objective of the research is to study the theoretical and computational properties of the MAP procedure in various statistical settings: *MAP testimation within normal means estimation problem*. There is a series of statistical problems where the object of interest is an unknown high-dimensional vector observed subject to Gaussian noise. The key extra assumption is that the means vector is sparse. *Model selection*. The goal of model selection is to select a parsimonious subset of "significant" explanatory variables and, thus, to reduce the dimensionality of the problem. Extensions of the results for MAP procedure in a Gaussian case to non-Gaussian settings are another direction for the proposed research.

Research Grants from the Open University Research Authority Fund

In 2007-2008, 111 requests for funding were submitted to the internal fund. The Steering Committee approved 77 requests: 2 research grants; 7 research grants for on-going research; 5 research grants for exploratory research; 3 research scholarships; 2 grants of excellence for doctoral students; 31 grants for continuing education research; 4 grants for research laboratory work; 6 sustenance fellowships for graduate science students doing research with senior faculty members; 3 sustenance fellowships for graduate students doing research with senior faculty members in all other disciplines; 2 grants for master's students; 4 grants for academic teaching staff to free time for research; 7 publishing grants; and one grant for editing.

Below are short descriptions of three of the studies that received grants from the internal fund:

- **Prof. Yair Auron**, "Israeli identities 2008 (Jewish-Israeli identity and Palestinian-Israeli identity)"

The proposed study is a continuation of a previous study on the subject of Jewish-Israeli identity, but differs from it in some very significant aspects. The previous study was conducted in 1990, and the sample included about 1,000 students, men and women, from teacher training colleges in the 3 educational sectors in Israel: State secular, State religious sector, and ultra-orthodox (Independent). The questions that we examined and others that we want to examine in the present study are the relationship between Jewish religion and Jewish nationality and between

Jewishness and Israeliness, attitudes to the Holocaust and its influence on the attitude toward the Israeli-Arab conflict and toward the Arab (Palestinian) population within and beyond the Green Line. The present study will examine the attitudes about 600 Open University students (secular, traditional, religious and ultra-orthodox Jews, as well as Israeli Arabs) regarding their identity, religion, nationality and citizenship.

■ **Dr. Nurit Gronau**, "Contextual and functional associations reduce competition between unattended objects: An fMRI study"

The proposed fMRI research will investigate whether contextually and functionally related objects (e.g., a kettle and a mug) can be *grouped* within a global percept, thereby reducing competition between real-world objects when these appear in an unattended region. Subjects will perform a central task while pairs of irrelevant objects will appear in a peripheral location. The pairs will include the same object replicated twice, two different but functionally related objects, or two different but functionally unrelated objects. We hypothesize that suppressive competition will be stronger for pairs of different objects than for same objects; however, within the different-pair objects, functionally related pairs will show relatively *reduced* competition (reflected in enhanced brain activation) due to contextual-grouping processes. Contextual and functional associations, therefore, may serve as important global factors that contribute to a coherent sense of the surrounding visual world.

■ **Dr. Merav Hadad**, "Black hole entropy in generalized theories of gravity"

The Bekenstein-Hawking entropy of black holes in Einstein's theory of gravity is equal to a quarter of the horizon area in units of Newton's constant G_N. Wald has proposed that, in general theories of gravity, the entropy of some black holes is a Noether charge, which is, in general, different from the Bekenstein-Hawking entropy. Ram Brustein, Dan Gorbonos and Merav Hadad showed that the Noether charge entropy is equal to a quarter of the horizon area in units of the effective gravitational coupling on the horizon G_{eff} rather than in units of G_N. This simple expression may be valid for a more general class of black holes, not only those for which the Noether charge entropy can be defined.

Honors and Awards

■ **Prof. Aviva Halamish** received the Hecht Prize, awarded by the Herzl Institute for the Research and Study of Zionism, University of Haifa, for a book on the history of Zionism, the *Yishuv* and the State of Israel, for her book, *A Dual Race Against Time: Zionist Immigration Policy in the 1930s*, published by Yad Ben Zvi (in Hebrew).

■ **Dr. Ram Ben-Shalom** received the Samuel Toledano Prize, awarded by the Misgav Yerushalayim Institute for Research on the Sephardi and Oriental Jewish Heritage for a research work about the Jewish past in Spain, for his book, *Facing Christian Culture: Historical Consciousness and Images of the Past among the Jews of Spain and Southern France during the Middle Ages*, published by Yad Ben-Zvi (in Hebrew).

■ *Science Magazine* chose a paper by **Dr. Anat Barnea** (Adar, Nottebohm & Barnea, "The relationship between nature of social change, age, and position of new neurons and their survival in adult zebra finch brain," *Journal of Neuroscience, 28*, 20 (2008), 5394-5400) as "Editors' choice."

■ *Discover Magazine* chose an article on a study by **Prof. Yoav Yair** (Price, Yair & Asfur, "East African lightning as a precursor of Atlantic hurricane activity," *Geophysical Research Letters, 34* (2007), L09805) as one of the "Top 100 Science Stories of 2007."

Supervision of Higher Degrees

Members of the senior faculty at the Open University supervise graduate students writing theses in our graduate programs. Some supervise doctoral students at other universities (in collaboration with colleagues from the university in which the students are enrolled), and are members of doctoral committees and referees of dissertations written at other universities.

The Chais Research Center for the Integration of Technology in Education

The Chais Research Center is dedicated to studying the integration of technologies in teaching processes and acts to encourage research on enhancing the integration of these technologies into OUI course teaching. The Center operates as a partnership among researchers from various OUI departments, supports studies conducted by its members and grants scholarships to outstanding students pursuing advanced degrees in relevant fields. The Center also conducts academic activities in the form of conferences, symposia and research seminars.

Research at the Chais Center in 2007-2008

- Perceived learning from recorded lectures
- Age (and cultural) differences in dialogic behavior
- The relations between attributional style and dialogic behavior
- The influence of Wiki editing on sense of ownership, perceived and actual learning
- Using Podcast to teach advanced literacy skills in the EFL classroom
- Media richness, media naturalness and perceived learning
- Self-presentation and its perception in online dating sites
- Parental authority style and adolescents' Internet use
- The effect of a computer literacy course on students' attitudes toward computer applications
- Doing difficult homework assignments:
  The dialogic behavior of elementary school students
  The dialogic behavior of secondary school students
  The impact of age, gender and culture on the dialogic behavior of 5th grade through university students
- The relationship between Open University science students' strategic and tactical approaches to study
- The relationship between academic discipline and students' dialogic behavior in Open University course forums
- The impact of academic discipline and perceived course difficulty on campus-based students' dialogic behavior
- The impact of instructor behavior on students' dialogic behavior in Open University course forums
- Wiki: The nature and extent of collaboration in an Open University course assignment – Integrating course forums into elementary schools: A case study
- The influence of navigation in 3D virtual environments on induction capabilities
- The influence of level of spoken language among hearing-impaired children on the perception of chronological sequences in a technological and non-technological representation
- The impact of using computer-mediated communication on social support among students with and without learning disabilities
- The impact of metacognitive instruction on students' achievements in a fully online course
- Using virtual reality technologies for improving the perception of chronological sequences among children with mild brain dysfunction
- CoSyM: A website for online calculations of continuous symmetry measures that emphasizes three-dimensional interactive visualization of molecules
- Usage patterns of course websites and their contribution to students with and without special needs at the OUI
- From information to knowledge in a collaborative online database: The instructor as a facilitator of students' metacognitive skills in an online course
- Instructor's scaffolding in students' metacognition in an online teachers' training course: A case study
- Critical reading in print and digital formats
- The effect of design on understanding print and digital text
- Life-long changes in digital literacy
- Making reading easier: The influence of vowelization in a deep language orthography on online text comprehension
- Students' attitudes toward learning in a fully online course
- Children's perception of "Behaving Objects" and its implications for the development of Artificial Mind Theory
- The digital games culture in Israel and Australia
- Friendship in cyberspace
- Online-learning usage patterns at the OUI
- A historical perspective on the pendulum-like changes in literacy

Decision to Offer a PhD Program at the Open University

The Academic Committee approved the establishment of a doctoral program in theoretical sciences at the Open University and formulated regulations for the doctoral program, which include the establishment of a Research Student Authority and a mechanism for appointing doctoral supervisory committees and reviewers. The proposed program is a general one and does not relate to specific disciplines. It will enable associate and full professors at the OUI to serve as independent doctoral thesis supervisors in the framework of the OUI. The doctoral students will receive high-quality supervision, and their involvement in research and teaching at the Open University will be a contribution to the OUI as well. As a result, if the doctoral program is approved by the CHE, the Open University will be similar to prestigious open universities, such as FernUniversität in Germany and the Open University in the UK, which are entitled to award doctoral degrees.