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17th Annual Governors State University Student Research Conference Proceedings

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PROCEEDINGS
OF THE CONFERENCE



17th Annual
STUDENT
RESEARCH
CONFERENCE

Governors State University
University Park, Illinois

Thursday, June 9, 2011

Editor:
Dr. Shelly Kumar
Division of Science
College of Arts and Sciences

**Proceedings of the
17th Annual GSU Student Research
Conference**

**Governors State University
University Park, IL 60466**

June 9, 2011

Editor:

**Dr. Shelly Kumar
Division of Science
College of Arts and Sciences**

PARTICIPANTS

Students of Governors State University

College of Arts and Sciences

College of Business and Public Administration

College of Education

College of Health and Human Services

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Dear Student Researcher:

Welcome to the Annual Governors State University Research Conference. We are proud of the excellence, expertise, and variety of your research presentations. Thank you for sharing your work with the GSU academic community.

A university education goes beyond the mastery of information to the creation of new knowledge. Congratulations to you and to your professors and advisers for participating in the joy of discovery. We are proud to count you as members of the GSU community.

Thank you for participating in this research conference and for what we hope will be a life-long commitment to new ideas.

Sincerely,


**Elaine P. Maimon, Ph.D.
President**

A MESSAGE FROM THE CONFERENCE STEERING COMMITTEE

The steering committee is pleased to announce the 17th Annual GSU Student Research Conference to be held on June 9, 2011. For the past sixteen years this conference has become a tradition in excellence, and we are confident that today again we will witness another session of quality presentations by our students. This conference will be presented in its original format and with its original objectives:

1. To provide students an opportunity to present their research work before an audience of their peers, and to use the comments they receive to improve presentations made at professional conferences.
2. To provide a forum to highlight research accomplishments at GSU, and honor students presenting their research work.
3. To generate enthusiasm among the student body in general, and encourage them to pursue research and other scholarly activities.
4. To enhance communications in the area of research among the four colleges at GSU. The interactions may also lead to collaborative work among students and faculty of different colleges.
5. To enhance the image of GSU in the area of teaching, as research is considered an integral part of teaching at the university level. In the long run a larger number of students attracted to research would enroll at GSU to pursue higher education.

The committee hopes that you will enjoy the conference, that you share in the excitement of doing research, and that you will look forward to participating in future student and professional conferences.

KEYNOTE SPEAKER BIOGRAPHY

The Student Research Conference Steering Committee is proud to announce that the keynote speaker for the lunch will be:

Dr. Umesh Garg, Ph.D.

Professor
Department of Physics
Notre Dame University
South Bend, IN

Dr. Umesh Garg, a Professor of Physics at the University Of Notre Dame, graduated from Birla Institute of Technology and Science in Pilani, India, and obtained a Ph.D. in experimental nuclear physics from the State University of New York at Stony Brook. After postdoctoral work at the Cyclotron Institute, Texas A & M University, he joined the Notre Dame faculty in 1982. He has held guest professorships at Vrije Universiteit, Amsterdam, the Netherlands, and the Bhabha Atomic Research Center, Mumbai, India. He is a Fellow of the American Physical Society and served on the Program Committee of the APS Division of Nuclear Physics during 1995-997. He has been Director of the Notre Dame Physics REU program since 2000.

With over 175 research publications, Dr. Umesh Garg is a prolific researcher in nuclear physics. His current research focus is on low-energy nuclear structure, with special emphasis on experimental determination of the nuclear incompressibility via measurements on the compression-mode giant resonances, and investigation of exotic quantal rotation in nuclei.

THE ATOMIC NUCLEUS AND STARS

Umesh Garg

Department of Physics
Notre Dame University
South Bend, IN

ABSTRACT

The stars get their energy from the nuclear fires raging in their cores. The same processes give rise to formation of all elements in the universe. In this talk, we will go on a journey from the beginning of time to the formation of stars, and the role that nuclear physics plays in generation of energy that fuels the stars and provides nuclear power on Earth.

17th Annual GSU Student Research Conference

June 9, 2011

PROGRAM SUMMARY

Sherman Recital Hall:

8:30 A.M. – 9:00 A.M.	Conference Registration & Continental Breakfast
9:00 A.M. – 9:10 A.M.	Welcome and Introduction
9:10 A.M. – 10:50 A.M.	Podium Presentations
10:50 A.M. – 11:10 A.M.	Refreshment Break
11:10 A.M. – 12:30 P.M.	Podium Presentations

Performing Arts Center Lobby:

12:30 P.M. – 1:15 P.M.	Lunch
1:15 P.M. – 2:00 P.M.	Keynote Address
2:00 P.M. – 2:30 P.M.	Poster Presentations
2:30 P.M. – 2:40 P.M.	Certificates Presentation to Student Participants
2:40 P.M. – 2:45 P.M.	Concluding Remarks

CONFERENCE PROGRAM

Conference Registration & Continental Breakfast

8:30 A.M. Sherman Recital Hall

Program Commencement Sherman Recital Hall

9:00 A.M. **Welcome and Introduction:**
Dr. Shelly Kumar
College of Arts and Sciences

Greetings:
Dr. Terry Allison, Provost

Podium Presentations Sherman Recital Hall

Session I Moderator:
Dr. Akkanad Isaac
College of Business and Public Administration

9:10 A.M. STREET ART AS A TOOL TO EXPOSE POVERTY AND HUNGER IN CHICAGO, Joseph Mikuzis and Frances Kostarelos*, Social Sciences, College of Arts and Sciences, p. 13.

9:30 A.M. WHEN UNIVERSAL HUMAN RIGHTS AND CULTURAL TRADITIONS CLASH, Greg Severin and Tracey Snow*, Counseling – Marriage and Family, College of Education, p. 14.

9:50 A.M. WHAT AFFECT DOES LOW FAMILIAL SOCIOECONOMIC STATUS HAVE ON STUDENT ACADEMIC SUCCESS, Linda Mattox and Mary Bruce*, Public Administration, College of Business and Business Administration, p. 15.

10:10 A.M. EXPLORING THE RELATIONSHIP BETWEEN VEGETARIANISM AND DIMENSIONS OF SPIRITUALITY, Christine Carlson and Albert Tuskenis*, Theoretical Psychology, College of Education, p. 16.

10:30 A.M. OUTCOMES OF A NEW CAPSTONE COURSE IN UNDERGRADUATE PSYCHOLOGY, Jennifer Miroballi and Jean Johnson*, Theoretical Psychology, College of Education. P. 17.

10:50 A.M. *Refreshment Break*

Session II Moderator:

Professor Cynthia Carr

College of Health and Human Services

- 11:10 A.M. THE VIEW OF GENERAL EDUCATION TEACHERS TOWARD THE PROFESSIONALISM OF SPECIAL EDUCATION TEACHERS, Christopher Toth, Philip Boudreau*, and Maribeth Kasik*, Multicategorical Special Education, College Education, p. 18.
- 11:30 A.M. CELEBRITY DIPLOMACY AND ITS IMPACT ON MOBILIZING AMERICAN YOUTH AND YOUNG ADULTS, Kadima Palles and Frances Kostarelos *, Social Sciences, College of Arts and Sciences, p. 19.
- 11:50 A.M. REVISING THE ROSENBERG SELF-ESTEEM SCALE, Erin Markase and Elizabeth Ruiz*, Psychology, College of Education, p. 20.
- 12:10 P.M. CONTROLLED- RELEASE ANTIBIOTIC NANOPARTICLES FOR CRANIAL TRANSPLANTATION AND BONE GRAFTING, Naga Anusha Adusumilli and Patty K Fu-Giles*, Analytical Chemistry, College of Arts and Sciences. p. 21.

Conference Lunch

Performing Arts Center Lobby

12:30 P.M.

Greetings

Dr. Elaine Maimon, President

Lunch

1:15 P.M.

Keynote Address

Dr. Umesh Garg

Department of Physics
Notre Dame University
South Bend, IN

Speaking on:

THE ATOMIC NUCLEUS AND STARS

Poster Presentations

Performing Arts Center Lobby

2:00 P.M. RELIGIOUS PLURALISM IN THE SUBURBS OF CHICAGO,
Daniel Smith and Frances Kostarelos*, Social Sciences, College of
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DIMERIZATION OF AMINO ACID DERIVATIVES: ANALYSIS
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and Shailendra Kumar*, p. 27.

2:30 P.M.

Certificates Presentation

Dr. Elaine Maimon, President

2:40 P.M.

Concluding Remarks

Dr. Shelly Kumar

ABSTRACTS OF PODIUM PRESENTATIONS

June 9, 2011

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University Park, Illinois

STREET ART AS A TOOL TO EXPOSE POVERTY AND HUNGER IN CHICAGO

Joseph Mikuzis and Frances Kostarelos*

Social Sciences
College of Arts and Sciences

ABSTRACT

Poverty and hunger is wide spread in Chicago, the nation, and the world. This presentation looks at street art in Chicago in the form of murals and graffiti that represent poverty and/or hunger. The street art is viewed as “expressive” civic engagement among the artist seeking to portray issues within their community. For this project, photographs were taken in various neighborhoods in Chicago. Different modes of transportation we're used (public transportation, bicycle, moped, automobile, and by foot) to discover and photograph murals and graffiti. The boundaries this research encompassed are Touhy Avenue to the north, 79th Street to the south, Pulaski Avenue to the west and Lake Michigan to the east. Two themes emerge in the body of photographs in this collection. First, public art represents food as part of a culture and identity. Second, public art speaks to injustice. The research was done approximately over three months. The results show that street art in Chicago represents poverty, injustice, and community identity.

WHEN UNIVERSAL HUMAN RIGHTS AND CULTURAL TRADITIONS CLASH

Greg Severin and Tracey Snow*

Counseling – Marriage and Family
College of Education

ABSTRACT

The United Nations was created in order to establish a new world order. In 1948, the U.N. passed a decree known as the Universal Declaration of Human Rights that assured every person on earth: dignity, worth, and equality. At what point does a cultural tradition violate this historic decree? This presentation will discuss various issues with respect to clash between universal human rights and cultural traditions.

WHAT AFFECT DOES LOW FAMILIAL SOCIOECONOMIC STATUS HAVE ON STUDENT ACADEMIC SUCCESS

Linda Mattox and Mary Bruce*

Public Administration
College of Business and Business Administration

ABSTRACT

Education is the enabler of opportunity and the enhancer of long-term financial stability and prosperity. This paper will examine whether there is a direct correlation to a student's academic success and their familial socioeconomic status and also demonstrates how inequalities based on race, gender and social economic status is threatening to the United States competitiveness and security in the global economy.

EXPLORING THE RELATIONSHIP BETWEEN VEGETARIANISM AND DIMENSIONS OF SPIRITUALITY

Christine Carlson and Albert Tuskenis*

Theoretical Psychology
College of Education

ABSTRACT

Some spiritual teachers and vegetarianism advocates propose that vegetarianism promotes spiritual development. Vegetarianism, that is, may enhance spiritual awareness, facilitate spiritual transcendence, and promote mystical experience and self-actualization. No published research was found that empirically addresses these notions. Thus, the present study will explore relationships between vegetarianism and spirituality by asking vegetarians to complete surveys measuring dimensions of spirituality and spiritual development.

OUTCOMES OF A NEW CAPSTONE COURSE IN UNDERGRADUATE PSYCHOLOGY

Jennifer Miroballi and Jean Johnson*

Theoretical Psychology
College of Education

ABSTRACT

In response to the APA call for explicit "capstone" experiences, we developed a new capstone course in our undergraduate psychology program. This study examines the outcome for the new course. Many consider the capstone course as an opportunity "to demonstrate comprehensive learning in their major through some type of product of performance" (Palomba & Banta, 1999, p.124). Preliminary results regarding the outcomes of this course will be presented.

THE VIEW OF GENERAL EDUCATION TEACHERS TOWARD THE PROFESSIONALISM OF SPECIAL EDUCATION TEACHERS

Christopher Toth, Philip Boudreau*, and Maribeth Kasik*

Multicategorical Special Education
College Education

ABSTRACT

The stigmatization associated with special education was not limited to just the students (Austin, 2001). Special education teachers were viewed as less than professional by their general education peers (Billingsley, 2004). This study explored the attitudes of the general education teachers to the professionalism of special education teachers. After the data was examined, recommendations were made to assist in improving the collaboration between general and special education teachers.

CELEBRITY DIPLOMACY AND ITS IMPACT ON MOBILIZING AMERICAN YOUTH AND YOUNG ADULTS

Kadima Palles and Frances Kostarelos *

Social Sciences
College of Arts and Sciences

ABSTRACT

This research was conducted with the purpose of gaining insight into whether celebrity diplomacy plays a role in mobilizing youth civic engagement. The rationale for this focus is based on the pro-celebrity diplomacy argument put forth by Cooper (2008) and Street (2004) that states that celebrities, because of their visibility, social status and economic power, are able to raise awareness and support from youth and young adults regarding global and political issues. During this research several methods of investigation were utilized. First, a profile of youth civic mindedness was constructed using existing literature. Next, celebrity websites were analyzed in order to interpret celebrity intention and effectiveness in targeting youth. Finally, surveys were distributed to youth in order to obtain qualitative data regarding youth familiarity and interaction with celebrity causes and issues of global poverty. The results, while informative, indicated that, due to the various dimensions of celebrity diplomacy and youth civic engagement, more individualized and focused research is needed to answer additional questions regarding this subject. For this presentation, the research dimension of celebrity websites will be the focus of further analysis. Utilizing existing research related to youth culture and media, the discussion will center around the effectiveness of celebrity websites in catching the attention of youth by dissecting four celebrity foundation websites designed to educate and gain support for specific causes. Next, using Bellah et al's (2008) research on civic engagement as well as research specifically on youth engagement by Miloski (2007), Delli Carpini (2000) and Flanagan and Levine (2010), the discussion will look more closely at whether these websites capture youth attention in a way that is meaningful and long-lasting in their contributions to youth's civic experience with local and global issues of poverty. The main point of examination here is whether social media and youth orientated websites are deepening ideas about civic responsibility for youth or whether these means of activism are instead further dehumanizing and oversimplifying the plight of and the solution for those living in poverty.

REVISING THE ROSENBERG SELF-ESTEEM SCALE

Erin Markase and Elizabeth Ruiz*

Psychology
College of Education

ABSTRACT

The purpose of the current study was to develop a revised version of the Rosenberg Self-Esteem Scale to better fit the reading skills of young children. While previous research has shown that the Rosenberg Self-Esteem Scale assesses self-esteem levels in adolescents, the current research is interested in assessing self-esteem levels in children. Therefore, this study reevaluated the scale. Findings were based on readability statistics and a trial run with approximately three to five children ranging in age from eight to eleven. Cronbach's Alpha was also calculated to test the reliability of the modified scale. The revised Rosenberg Self-Esteem Scale will be used to study self-esteem in school-aged children.

CONTROLLED- RELEASE ANTIBIOTIC NANOPARTICLES FOR CRANIAL TRANSPLANTATION AND BONE GRAFTING

Naga Anusha Adusumilli and Patty K Fu-Giles*

Analytical Chemistry
College of Arts and Sciences

ABSTRACT

The purpose of this study is to develop a unique nanoparticulate system that is capable of providing direct, extended-release antibiotics for patients receiving cranial replacement implants and bone grafting. The research involves the incorporation of encapsulated antibiotic nanoparticles in a polymer (such as poly methylacrylate-isobutene-monoisopropylmaleate) with an alcohol carrier solvent. When the carrier solvent evaporates, the polymer with embedded nanoparticles will form a thin film that is capably attached to any surface it will have been applied to. This product can be directly applied to polymethyl methacrylate (PMMA) cranial implants and hydroxylapatite bone grafting materials. Local application of encapsulated antibiotics directly to the surgical sites can provide a non-oral, non-intravenous, controlled time-release treatment, which would allow continuous administration of antibiotic therapy over the prescribed time span of the individual antibiotics used. We have successfully encapsulated both hydrophobic and hydrophilic antibiotics using reverse micelles and liposomes. This delivery method provides a novel chemotherapeutic regime for the prevention and treatment of bacterial, fungal, and viral infections often occurred in cranial/bone transplant patients with a more efficient effective dose.

ABSTRACTS OF POSTER PRESENTATIONS

June 9, 2011

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Governors State University
University Park, Illinois

RELIGIOUS PLURALISM IN THE SUBURBS OF CHICAGO

Daniel Smith and Frances Kostarelos*

Social Sciences
College of Arts and Sciences

ABSTRACT

Religious Pluralism is more prevalent today than it has ever been. Religious pluralism can be seen throughout the world, and has an effect on almost every aspect of life, even the use of politics and military action. While many people may not even know or realize what religious pluralism is, it has a very important place in our everyday lives, and maybe should be given more attention by people everywhere.

This study focused on religious pluralism in the south suburbs of Chicago where signs of religious pluralism abound on the cultural landscape. This study discovered many changes among religion institutions in the area, from church's leaving their community, to groups across denominations sharing space in a climate of resource scarcity, to new religions being represented which 20 years ago would not have had a chance to be in the area. Many people have had to make sacrifices of either location or personal beliefs in order to continue going to a certain church, and have adopted other beliefs that they themselves may not have accepted before.

This visual and reflective presentation shows continuity and many changes resulting from population growth and a growing service sector economy. The research informing this presentation includes participant observation in local church, mapping existing churches with an eye for all forms of religious institutions and expression on local landscapes, interviews with pastors, and meeting with lay leaders. While many institutions represented in this study have a long and unbroken history in the settlement, others religious bodies are giving way to rapid commercial development, resource scarcity, and instability.

SECURING HYPERVISORS AND THE VIRTUAL INFRASTRUCTURE: WHAT CAN BE DONE?

Matthew McKain and David Green*

Computer Science
College of Arts and Sciences

ABSTRACT

Virtualization has seen significant increases in the past five years as companies look for ways to simplify and streamline their IT operations. One cannot help but notice when looking at the daily technology news websites, IT and software development journals, the terms virtual, virtualization, virtual machines, or hypervisors used extensively. These terms are becoming as ubiquitous as network security and cloud computing. The fact is that all three of these areas in IT share a unified purpose which has made them such hot topics as of late: IT departments want to make providing, supporting, and maintaining their products and services for both customers and employees as efficient and effective as possible. With cloud computing, software vendors hope to deliver on this promise by providing software to their clients via the Internet. Hosting these services takes much of the burden off of in-house IT staff, as they do not have to maintain the hardware and software themselves. They do not have to worry about securing these computing environments as the provider assumes this responsibility as well. Software service providers, therefore, need to establish efficient, cost effective processes, while keeping security at the forefront of each decision. Processes alone are not enough, however, when it comes to providing an efficient, secure computing environment for their clients. As such, IT companies have embraced virtualizing significant portions of their server spaces, and are now looking at the desktop in the same vein.

NOVEL RUTHENIUM COMPOUNDS AS PHOTODYNAMIC THERAPEUTIC AGENTS

Sareen Kumar Kushangari and Patty K. Fu-Giles*

Analytical Chemistry
College of Arts and Sciences

ABSTRACT

Ruthenium complexes have been developed to overcome the cellular resistance developed against the well-known anti-cancer drug Cisplatin. Cisplatin has a limited activity against most common forms of breast and gastrointestinal tumors. In this research, octahedral Ruthenium complexes were synthesized and characterized. Various strategies have been employed to improve the sequence selectivity of cleavage which can arise from preferential binding at a certain site. DNA binding and photocleavage properties of these complexes are reported. Both the complexes have their absorbance maximum in the visible region (415 nm). Cancer cells have lower pH and generally hypoxic compared to the normal cells. Ruthenium complexes are inactive and non-reactive until they enter the cancer cells where they are reduced to more active forms (activation by reduction). For the compounds to be active in vivo, the complexes must have a biologically accessible reduction potential, which can vary with the ligands present. Furthermore, Ruthenium complexes are well known to bind to the DNA forming adducts which block the DNA and RNA synthesis and induce apoptosis programmed cell death. In this study, various Ru compounds would be tested for their potential as photodynamic therapeutic agents. Cytotoxicity and phototoxicity of these Ruthenium complexes towards the human skin fibroblast cells will be measured and the LD50 (leathal dose 50) will be calculated.

ENCAPSULATED ANTIBIOTIC NANOPARTICLES FOR CRANIAL TRANSPLANTATION

Srikanth Dammalapati, and Patty K. Fu-Giles*

Analytical Chemistry
College of Arts and Sciences

ABSTRACT

Craniotomy done in cranial/bone transplant patients is usually associated with aneurysms and is prone to bacterial infections. In this current research, we are going to investigate a novel drug delivery system which provides a sustained release of the antibiotic coated on to the Polymethyl Methacrylate (PMMA) polymer. Local application of these encapsulated antibiotics is proposed to show a controlled time release and hence protection for over few weeks.

The technique, we are going to employ for preparing the nanoparticles would be liposomes and micelles they are completely bio degradable and nontoxic. These systems have been extensively studied and have records of efficient drug delivery. In order to identify the suitable technique, we would be studying different concentrations of drug and polymers as well as various sizes of the nanoparticles. To obtain a uniform coating of drug on the polymer, we would choose the best compatible solvent.

Vancomycin (antibacterial) and acyclovir (antiviral) are the drugs used for this study. These drugs will be incorporated into nanoparticles. Once, we are confident about the efficient encapsulation of the drug, we would test these nanoparticles to know the antibacterial activity. In the next step we are going to study the solubility properties of these polymers in carrier solvent either in water or alcohol to apply on to the PMMA implants for even distribution of the polymers, and different techniques for the application of these nanoparticles on to the implants. In future, we would test these nanoparticles in vitro to observe the activity.

DIMERIZATION OF AMINO ACID DERIVATIVES: ANALYSIS BY NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY (NMR) AND LIQUID CHROMATOTRAPY MASS SPECTROMETRY (LC-MS)

Maneesha Jakkampudi, Jayesh Patel, and Shailendra Kumar*

Analytical Chemistry
College of Arts and Sciences

ABSTRACT

Photooxidation of proteins with light and oxygen has been known to cause cross-linking in proteins. The cross-linking of proteins in the eye lens leads to cataract formation. Six of the twenty amino acids in proteins are known to get photooxidized. It is likely, then that one or more of these six amino acids are involved in formation of cross-links. The amino acid, cysteine is known to form cross-links via a disulfide bond. In this study, we are interested in finding out cross-links from amino acids other than cysteine. However, searching for relatively few cross-link bonds during photooxidation of proteins has been found to be quite tedious by other researchers. Our present study involves photooxidation of N-acetylhistidine ethylamide, and N-acetyltyrosine ethylamide, the derivatives of histidine and tyrosine, respectively, in which the amine groups and the carboxylic acid groups have been converted to amide bonds. This conversion makes these amino acids peptide-resembling amino acids so that their photooxidation mimics the photooxidation of histidine and tyrosine moieties in proteins. In our laboratory, photooxidation of the histidine derivative by visible light in the presence of oxygen and rose Bengal, a photosensitizer, caused extensive degradation of the imidazole ring of the histidine via the initial endoperoxide, which has been shown to get converted to hydrated imidazolone. In our photooxidation reaction, we have shown formation of a dimer by the reaction of the hydrated imidazolone with the second molecule of N-acetylhistidine ethylamide. The dimer was identified by its mass spectrum. The formation of this dimer under the photooxidation conditions raises a strong possibility of cross-links formed by histidine residues in proteins. The present research focuses on confirmation of the histidine derivative by mass spectrometry and by nuclear magnetic resonance spectroscopy. We have devised a similar study for the tyrosine derivative. The results of these studies will be presented.

STUDENT PARTICIPANTS

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Naga Anusha Adusumilli	Analytical Chemistry, CAS	21
Christine Carlson	Theoretical Psychology, CE	16
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Sareen Kumar Kushangari	Analytical Chemistry, CAS	25
Erin Markase	Psychology, CE	20
Joseph Mikuzis	Social Sciences, CAS	13
Linda Mattox	Public Administration, CBPA	15
Matthew McKain	Computer Science, CAS	24
Jennifer Miroballi	Theoretical Psychology, CE	17
Kadima Palles	Social Sciences, CAS	19
Jayesh Patel	Analytical Chemistry, CAS	27
Greg Severin	Counseling – Marriage and Family, CE	14
Daniel Smith	Social Sciences, CAS	23
Christopher Toth	Multicategorical Special Education, CE	18

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David Green	CAS	24
Jean Johnson	CE	17
Maribeth Kasik	CE	18
Frances Kostarelos	CAS	13, 19, 23
Shailendra Kumar	CAS	27
Elizabeth Ruiz	CE	20
Tracey Snow	CE	14
Albert Tuskenis	CE	16

CONFERENCE STEERING COMMITTEE

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Dr. Shelly Kumar

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Dr. Akkanad Isaac, College of Business and Public Administration

Dr. Maribeth Kasik, College of Education

Dr. Frances Kostarelos, College of Arts and Sciences

ACKNOWLEDGMENT

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