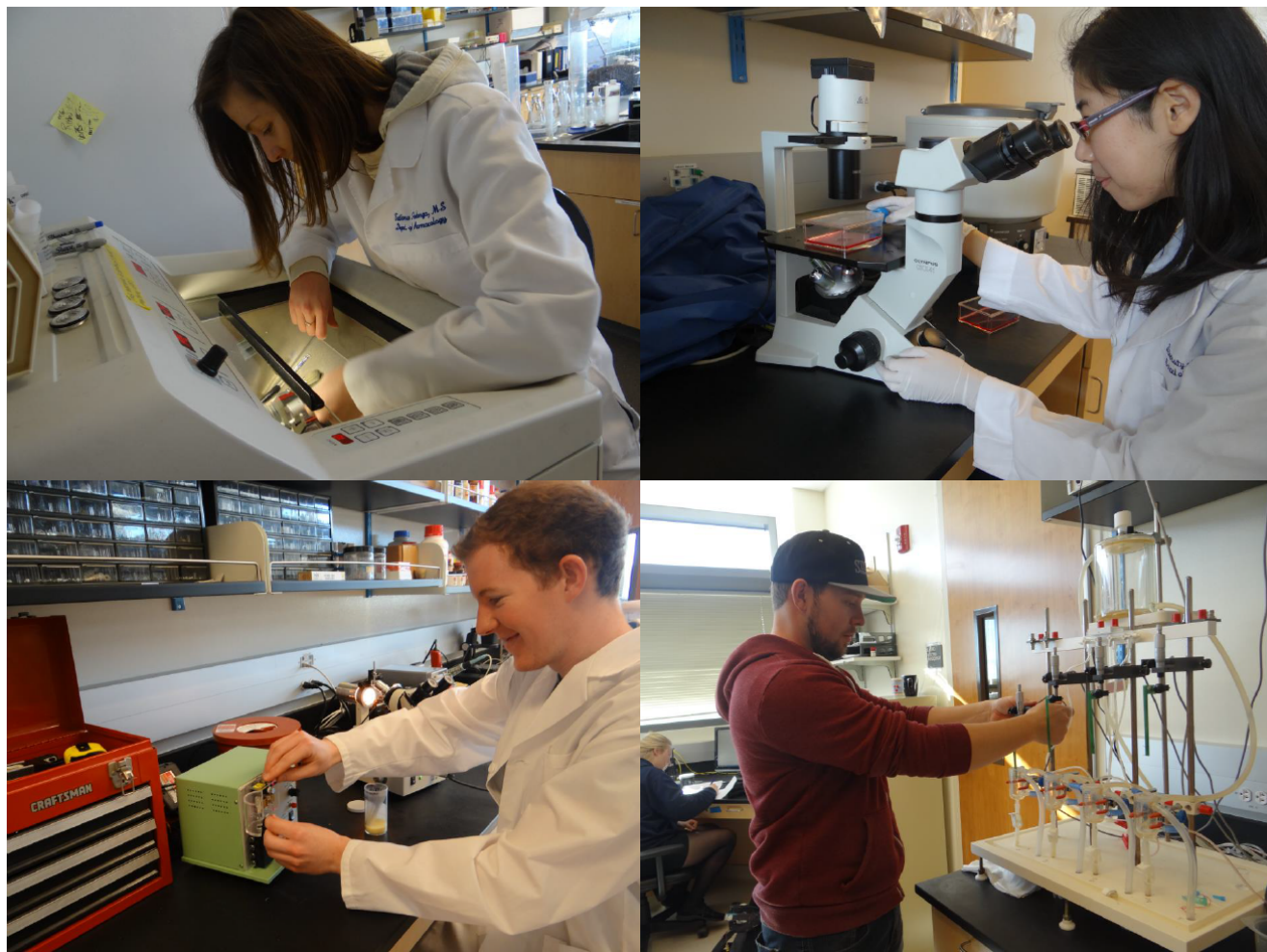


# Cellular and Molecular Pharmacology and Physiology (CMPP) Interdisciplinary Graduate Program

*University of Nevada, Reno*

**Self-Study (2008-2015)**



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## CMPP Program Vital Statistics

CMPP program established	<b>1991</b>
Current number of CMPP Faculty	<b>32</b>
Number of Departments represented by CMPP faculty 2008-2015	<b>5</b>
Number of CMPP Students 2008-2015	<b>53</b>
Students Graduated with PhD 2008-2015	<b>27</b>
Students Graduated with combined MD/PhD degree 2008-2015	<b>1</b>
Average time to PhD degree 2008-2015	<b>4.8 years</b>
Average GPA of incoming CMPP students 2008-2015	<b>3.37</b>
Average combined new GRE score of incoming CMPP students 2012-2015	<b>311</b>
Number of CMPP Student Publications 2008-2015	<b>101</b>
Percentage of graduating CMPP students with a publication 2008-2015	<b>100%</b>
Number of CMPP Faculty Publications 2008-2015	<b>600</b>
CMPP Faculty Grant Awards (Dept. Pharmacology and Dept. Physiology and Cell Biology) 2008-2015	<b>\$87,177,000</b>

## **I. PROGRAM HISTORY, MISSION, AND ADMINISTRATIVE STRUCTURE**

### **I.1 Program History:**

The *Cellular and Molecular Pharmacology and Physiology* (CMPP) Interdisciplinary Graduate Program at the University of Nevada, Reno (UNR) was established in 1991 after the Board of Regents accepted a proposal submitted by Dr. William T. Gerthoffer, then an Associate Professor in Pharmacology at UNR. The UNR administration and the School of Medicine promoted this effort in strategic planning efforts in the 1980's to develop new high quality “broad-based” graduate programs that would involve interdepartmental cooperation and interdisciplinary approaches to the basic sciences. The Department of Pharmacology, which had recently formed and was chaired by Dr. David Westfall, had at that time already firmly established as a strong research and teaching department at UNR, and offered graduate training in Pharmacology both at the MS and Ph.D. levels. The Department of Physiology (now called “Physiology and Cell Biology”), chaired by Dr. Kenton M. Sanders, was undergoing a major phase of expansion had no graduate programs of its own.

The CMPP program was created to expand the curriculum of the Graduate Program in Pharmacology by complementing the research training opportunities of students and exposing them to more advanced concepts and methods in the physiological sciences which would strengthen their grasp of how drugs and molecules interact with living systems. It was the youngest of three interdisciplinary graduate programs in the biomedical sciences at UNR, the other two being Biochemistry, and Cellular and Molecular Biology (CMB). All three programs abided by the principle that their listed graduate faculty would be part of multiple graduate programs.

In its first year of operation, 1992, the program admitted four students who all graduated in 1996. Some students enrolled in the Pharmacology Graduate Program during years prior to 1992 were transferred in the CMPP program and graduated as CMPP students before 1996. From 1992 until 2000, the program continued to admit students at a rate of between one and four students per year. During that period new graduate faculty, many based outside the two founding departments, joined the core of CMPP faculty. Dr. Burton Horowitz, Professor of Physiology and Cell Biology, became the second CMPP Director at the beginning of 1997 and assumed the position until the program was restructured in the middle of 2003.

At the turn of the new millennium and after several years of strategic planning at higher

levels of the institution, the former Vice-President for Research and Dean of the Graduate School, Dr. Linda Brinkley, formalized a plan designed to restructure the existing interdisciplinary graduate programs in the biomedical sciences at UNR into a broader umbrella program modeled on programs offered by other institutions. The new program initially called “Molecular Biosciences and Biotechnology (MBB)” and later renamed to “Molecular and Cellular Biosciences (MCB)” was developed in 2001-2004 and officially began to admit students July 1, 2003. All existing interdisciplinary biomedical programs including CMPP were terminated on that date. Dr. James Kenyon, Professor of Physiology and Cell Biology at UNR, was named Director of this program and along with the Associate Dean of the Graduate School, Dr. Marsha Read, formed several committees charged to outline its curriculum and bylaws for a rapid implementation. This effort led to a lot of grief and confusion in regard to the status of students previously enrolled in the defunct graduate programs, the admission process and the rules determining whether each department would get its fair share of incoming students, the new curriculum, and the financial and human burden of all departmental units involved. This led the VPR Office to abandon this project at the end of 2004. All previously deceased graduate programs were resurrected around the beginning of 2005.

Dr. James Kenyon assumed the position of Director of the CMPP program and was assisted by Dr. Normand Leblanc, Professor of Pharmacology who was voted Director-Elect. Dr. Leblanc officially assumed the position in January of 2006. In 2005, the resurrected CMPP program headed by Dr. Kenyon underwent a major review of its curriculum, committee memberships, and policies and procedures.

In 2010 Dr. Brain Perrino, Associate Professor of Physiology and Cell Biology was appointed Director of the CMPP graduate program. During this period there was the beginning of the integration of the CMPP graduate program with the Molecular Biosciences Interdisciplinary Graduate program, which included graduate programs in Biochemistry and Cell and Molecular Biology (CMB). Some of the courses offered in the CMPP program were part of the medical school curriculum including Systems Physiology and Pharmacology. In 2012 the School of Medicine underwent a major change required by the Office of Medical Education for MD education adopted a systems-based curriculum which included no credit-based courses. The CMPP program had to develop new graduate levels courses for its students who formally studied Pharmacology and Physiology in medical courses.

In 2014, Dr. Dean Burkin, Professor of Pharmacology was appointed Director of the CMPP

graduate program. Dr. Burkin, with the help of the CMPP faculty, implemented new graduate courses in Physiology and Pharmacology to replace those originally offered through the School of Medicine. Dr. Burkin continued to integrate the CMPP program into the Molecular Biosciences Interdisciplinary Graduate program in which recruitment of students fell under this umbrella program. Due to the larger application pool of students there was more opportunity and funds available among the three programs to recruit students. Along with the CMPP executive committee Dr. Burkin has continued to refine the CMPP curriculum to ensure CMPP graduate students have the best graduate level training in physiology and pharmacology.

#### I.1.2 Molecular Biosciences Interdisciplinary Graduate Program

The graduate programs in Biochemistry, Molecular and Cellular Biology (MCB, Interdisciplinary), and Cellular and Molecular Pharmacology and Physiology (CMPP) (CMPP, Interdisciplinary) were integrated into a single interdisciplinary program in Molecular Biosciences (MB) in 2010 with the following aims: 1) recruit new students on a regional, national and international basis, 2) improve the quality of graduate students, 3) improve recruitment coordination with minority and underrepresented groups, 4) provide greater flexibility in matching students with research mentors, 5) improve funding stability for graduate students through the Graduate and Teaching Assistantships, 6) provide greater breadth and depth of course offerings, 7) leverage broader faculty participation for team teaching of the first year core curriculum, 8) support an interdisciplinary seminar program, 9) foster research collaboration by breaking down departmental and programmatic barriers that currently divide students and faculty, 10) strengthen opportunities to establish internship, externships, coursework, training opportunities and reduce the current precarious funding situation with little intramural underpinning, 11) strengthen our ability to attract programmatic support and establish permanent fellowship programs.

The MB program is supported through the Office of the VPRI directed by Dr. Mridul Guatum and administered by the Graduate School by Dr. David Zeh. Dr. David Zeh provides administrative support in admitting and providing informational support for graduate students (Fig 1). The graduate program Directors of Biochemistry (Dr. John Cushman), CMB (Dr. Patricia Berninone) and CMPP (Dr. Dean Burkin) are responsible for the MB program, share a budget administered through the Graduate school and participate in joint recruitment of new graduate students.

## **I.2 CMPP program Mission:**

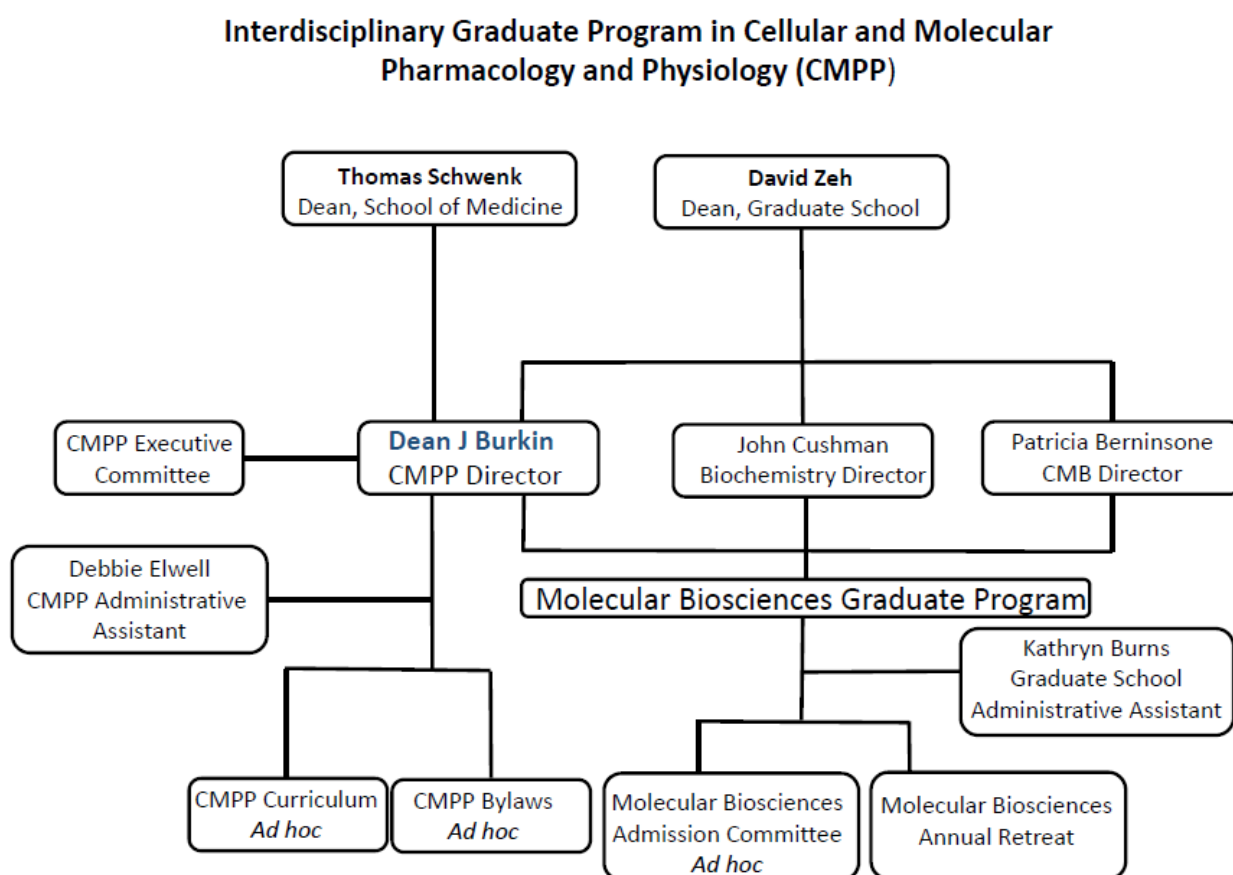
The *Cellular and Molecular Pharmacology and Physiology* (CMPP) Program at the University of Nevada, Reno (UNR) is an interdisciplinary Graduate Program that offers graduate studies culminating in the Doctor of Philosophy degree (Ph.D.) and prepares the students for careers in basic biological and biomedical research, industry, and teaching. The graduate program is centered within the Departments of Pharmacology, and Physiology and Cell Biology, both housed within the School of Medicine at UNR, but also includes faculty from other academic units such as Biochemistry, and the Department of Biology in the College of Science at UNR. Research emphasis encompasses areas such as molecular pharmacology, the biophysics, biochemistry and molecular biology of ion channels and signal transduction, cell physiology, gastro-intestinal and cardiovascular pharmacology and physiology, the molecular mechanics of smooth muscle contraction, muscular dystrophy, reproductive biology, autonomic pharmacology and neuropharmacology. The program is designed to prepare the student for a competitive research and teaching career in pharmacology or physiology. A flexible, multidisciplinary basic sciences curriculum, combined with advanced pharmacology and physiology courses, provides the foundation of knowledge needed for subsequent research activities. Individual laboratory attention by the faculty allows the student to develop skills in experimental design, execution, and analysis, statistics, literature searching, grant writing, manuscript preparation, oral presentations, and laboratory management. The focus of the doctoral research may be tailored to the student's interests, goals and abilities. The program typically requires four to five full years to complete.

## **I.3 CMPP Program Administrative Structure and Objectives:**

### **I.3.1 Program Director:**

Under the umbrella of the Molecular Biosciences Interdisciplinary Graduate Program, the CMPP program is currently directed by Dr. Dean Burkin, Professor, Department of Pharmacology (2014-present). An organizational chart of the program is outlined in **Figure 1**. For the period relevant to this review, Dr. Burkin was preceded by Dr. Normand LeBlanc, Professor, Department of Pharmacology (2006-2010) and Dr. Brian Perrino, Associate Professor, Department of Physiology and Cell Biology (2010-2014). The major functions of the CMPP

Director are to administer the operation of the program including: 1) curriculum development and implementation (20%), 2) recruitment, admission, retreat and support of students (60%), 3) preparation and administration of the program budget (10%), and 4) the recruitment and assignment of faculty to program committees (10%). The Director represents the program to the Dean of the Graduate School and the Dean of the School of Medicine. The Director typically serves for four years. However, the CMPP Executive Committee can recommend an extended or abbreviated term with approval of two-thirds of the CMPP faculty and the Dean of the Graduate School.



**Figure 1:** *Organizational Chart of the Cellular and Molecular Pharmacology and Physiology (CMPP) Graduate Program at the University of Nevada, Reno.*

The departmental affiliation of the Director normally rotates between Physiology & Cell Biology and Pharmacology in subsequent terms. However exceptions to this policy may be recommended by the Executive Committee and implemented upon approval of two-thirds of the CMPP faculty



and the Dean of the Graduate School. The executive committee solicits nominations for a new Director in the third year of the current Director's term. The new director is elected by simple majority vote of the Executive Committee, with approval of the Dean of the Graduate School, and approval by a simple majority vote by the participating faculty. He or she serves one year as Director-Elect followed by four years as Director. The Director is assisted by Administrative Assistants, the CMPP Curriculum, Admissions and Bylaws committees. The Director receives a stipend from the Graduate School that is attributed on an estimated workload formula established by the university.

#### I.3.2 Administrative Assistants:

Mrs. Debbie Elwell serves as the Administrative Assistant of the CMPP graduate program to assist the Director in the daily operations of the program. Mrs. Elwell's salary is supported by the Department of Pharmacology. Ms. Kathryn (Kayleigh) Burns serves as administrative assistant for the Molecular Biosciences program and helps with admissions and the annual retreat. Ms. Burn's salary is supported by the Graduate School and office of the VPRI.

#### I.3.3 Executive Committee:

The Program Director is advised by a standing Executive Committee composed of five members, the Program Director, Dr. Iain Buxton, Chair of Pharmacology and Dr. Kenton M. Sanders, Chair of Physiology and Cell Biology, James Kenyon, Senior Associate Dean for Research and Dr. Normand LeBlanc, Professor of Pharmacology. The Executive Committee advises the Director, and assists in administering all aspects of the program. The two members appointed by the Department Chairs have the responsibility of advising the first year students and reporting to the Executive Committee as a whole on their progress. Changes affecting major administrative re-organization of the program or its policies and procedures require a simple majority vote of the Executive Committee, and approval by two-thirds of the full CMPP faculty.

#### I.3.4 Admissions Committee:

The CMPP Admissions Committee falls under the Molecular Biosciences Interdisciplinary Graduate program. Under this program between 50 and 80 applications are received annually and between 8 to 14 students are admitted depending on available funds and stipends. The CMPP Executive Committee appoints at least two members from CMPP faculty to serve on the

Molecular Biosciences admission committee which is also made up of faculty members from Biochemistry and CMB faculty. Approximately 7-9 faculty make up the Molecular Biosciences admissions committee. The Graduate school receives the applications which are then processed for completeness and a summary table containing applicant information is shared with the admissions committee. The committee is responsible for reviewing student applicants, evaluating student applications, and reporting on the admissions process. The Admissions Committee submits a written (email) report describing the admitted students to the Molecular Bioscience Directors usually in February or March of the admission year. The Directors of the Molecular Biosciences Graduate Program forward these recommendations to the Graduate School for acceptance and sends notification of admission letters to the accepted students. In addition, individual faculty members may identify one or more approved applicants and advise the Admissions Committee of their willingness to provide stipend support to the CMPP Graduate Program for these individuals who will then be accepted into the program as described. All students will enroll in the same curriculum (including rotations). In exceptional cases, the Admissions Committee evaluates applications outside of the “normal” timeline described above. These applications are scored, as “Approved” or “Disapproved” and admission and stipend support is awarded as described above.

#### I.3.5 Bylaws Committee:

The Executive Committee has the authority to select committee members and charges the committee to revise concerns about the policies and procedures that were raised by CMPP faculty or students.

##### I.3.5.1 Composition of the CMPP Bylaws Committee (2005-2015):

*Chair:* Dr. James Kenyon, Professor, Department of Physiology & Cell Biology

*Members:* Dr. Normand Leblanc, Professor, Department of Pharmacology

Dr. Gale Craviso, Professor, Department of Pharmacology

Dr. Chris von Bartheld, Professor, Department of Physiology & Cell Biology

#### I.3.6 Curriculum Committee:

As for the Bylaws Committee, the CMPP Curriculum Committee is an *Ad Hoc* committee formed by the Executive Committee when issues pertaining to the curricular activities of the

program arise. A review of this very important aspect of the program will be conducted soon with emphasis on seeking significant input from existing as well as students who have graduated during this period.

#### I.3.6.1 Composition of the CMPP Curriculum Committee (2005-2015):

*Chair:* Dr. James Kenyon, Professor, Department of Physiology & Cell Biology

*Members:* Dr. Normand Leblanc, Professor, Department of Pharmacology

Dr. Kathleen Keef, Professor, Department of Physiology & Cell Biology

Dr. Chris von Bartheld, Professor, Department of Physiology & Cell Biology

#### I.3.7 CMPP Graduate Faculty:

Any faculty member of the University of Nevada, Reno holding a Ph.D. degree and conducting research in the disciplines of physiology, pharmacology, cell biology, or related biological sciences may apply for admission to the CMPP graduate faculty. Applicants must submit a letter of application and curriculum vitae to the Program Director. The Director distributes copies of the curriculum vitae to all current CMPP faculties and then supervises a vote of the entire CMPP faculty. The faculty member will be accepted if two thirds of the current faculty votes in favor of the application. Every 3 years the Executive Committee reviews the status of CMPP graduate faculty to determine if they are contributing to the program. All CMPP graduate faculty must continue to meet the following two criteria in order to retain their status: a) continue to engage in appropriate scholarly/creativity/research activities, and b) have been engaged in teaching and/or mentoring of graduate students. If a faculty does not meet both criteria, the concerned individual will be informed of the situation in writing and will be placed on an inactive list unless he or she wishes that his or her name be withdrawn from the CMPP graduate faculty. Any faculty on the inactive list will have the opportunity to be reinstated by the Executive Committee upon demonstration of a reversal of his or her scholarly/creative/research activities (e.g. new grant award) or changes in teaching and/or mentoring status. CMPP graduate faculties who remain inactive for a period of 5 years will be removed from the list.

**The policies and Procedures for the CMPP graduate program are outlined in Appendix A.**

## **II. GRADUATE COURSES AND DEGREE PROGRAM**

### **II.1 Overview of the Mission and Objectives of the Program:**

The mission of the CMPP graduate program is to prepare students for careers in basic biological and biomedical research, industry, and teaching with a focus on Pharmacology, Cell Biology and Physiology. The program emphasizes training in molecular and cell biology to enable the students to tackle more complex problems and mechanisms taking place at the cellular, tissue, organ and systemic levels. The following are the Student Learning Objectives (SLO) for the program:

- To enhance the student's knowledge in molecular biology, genetics, biochemistry, cell biology, physiology and pharmacology
- To enable the student to learn a broad array of techniques to tackle multidisciplinary research questions
- To familiarize the student with ethics in science
- To develop critical thinking
- To enable the student to work independently with minimal supervision in a collaborative environment
- To develop manuscript and grant writing skills, as well as the ability to communicate orally

### **II.2 Relation of the CMPP Graduate Program to the Needs of the State, Nation and Other Graduate Programs:**

The CMPP graduate program is the only program of its kind in the state and therefore fulfills an important role for Nevada undergraduate students seeking training in pharmacology and physiology that may not have the financial support or desire to be trained in other states. At the national level, there are certainly graduate programs offering excellent training. In the context of being in a small to medium size medical school and university, the research interests of the CMPP faculty have initially focused in a few selected areas that quickly progressed to achieving and maintaining national and international recognition. These include gastro-intestinal motility, smooth muscle ion channels and calcium signaling, cardiac excitation-contraction coupling, neuroscience, muscular dystrophy and reproductive sciences. With the enormous expansion of interests in molecular biology, undergraduate students have begun to move away from the more

traditional training in the pharmacological and physiological sciences, which are now desperately needed to investigate diseases using translational approaches. The CMPP program (and other similar programs as well) therefore fulfills the needs of the nation to continue and enhance the training of future scientists in this discipline. The CMPP program plays an important role in supporting other graduate programs at UNR, in particular the CMB, Biochemistry and the new Neuroscience programs. Since CMPP graduate faculty may be part of more than one graduate program, students from other programs have the opportunity to rotate in CMPP laboratories and learn new techniques. The CMPP program offers a number of courses (listed below), which are not restricted to CMPP students and are taken from time to time by students from other programs. Finally, the CMPP and Molecular Biosciences program has had an excellent seminar series that have benefited UNR students from all programs.

### **II.3 Graduate Degrees, Majors, Options, Certificates and Interdisciplinary Programs**

#### **Contributing to the Graduate Program:**

The International Student Program was initiated in 1991 by Dr. Sean Ward, a CMPP faculty member in the Department of Physiology and Cell Biology and has continued to the present date. The program initially established the exchange with the University of Ulster. In 1998, the Queens University in Belfast also joined the exchange. In 2005, the University of Dundee, Scotland and in 2008, the University of Manchester, England subsequently joined the International Student Program. After three years of undergraduate training in biomedical sciences, these students would come to Reno for one full year to work in a CMPP laboratory to acquire research experience. The students then returned to their country to complete their Bachelor's degree after another year. This program has been extremely successful both in terms of the training offered to the students but also in attracting the best students in the program after they graduate. Many of them have started successful careers in the medical research environment. While at the University of Nevada, all of these students have presented their projects at either National Conferences or to the faculty at the School of Medicine. In addition, there have been numerous scientific publications, or papers submitted for publication in National and International Journals with these students as co-authors. Over the past seven years 12 students from Great Britain have been admitted into the program with 8 successfully graduating with their PhD and 3 currently progressing towards their degree.

Besides the seminar series offered by individual departments, the Biochemistry graduate

program, and the CMB graduate program, the CMPP program directly benefits from courses offered by the Biochemistry and CMB graduate programs. Those are listed in the following table:

**Table 1.** *Courses Offered by Different Graduate Programs at UNR.*

<b>Course Name</b>	<b>Course Number</b>	<b>Number of Credits</b>	<b>Program or Department Offering Course</b>	<b>Year Taken</b>	<b>Mandatory</b>
Systems Physiology	PCB 711	7	Physiology and Cell Biology	1 (F)	Yes
Molecular Genetics	BCH 705	3	Biochemistry	1 (F)	Yes
Molecular Cell Biology	CMB 710	4	Cell Biology and Biochemistry	1 (F)	Yes
Molecular Pharmacology	PHAR 710	3	Pharmacology	2 (F)	Yes
Ethics and Scientific Research	PHAR 725	2	Pharmacology	2, 3 or 4 (F)	Yes
Neuroeffector Pharmacology	CMPP 740	3	Pharmacology	2, 3 or 4 (F)	Yes
Biostatistics in Public Health	CSH 780	3	Biochemistry	2, 3 or 4 (F)	Yes

F: Fall semester; S: Spring Semester.

#### **II.4 CMPP Program Course Contributing to Other Graduate Programs:**

The list of CMPP graduate courses open to all students meeting minimal requirements are as follows:

**Table 2.** *Course Offered by the CMPP Program at UNR.*

<b>Course Name</b>	<b>Course Number</b>	<b>Number of Credits</b>	<b>Frequency of Offering</b>
Neuroeffector Pharmacology	CMPP 740	3	Once every 3 years during the Fall semester
Ethics and Scientific Research	PHAR 725	2	Pharmacology
Systems Physiology	PCB 711	7	Physiology and Cell Biology

## II.5 Overall Design of the CMPP Curriculum:

The minimum requirements for a Ph.D. are set by the Graduate School at 72 graduate credits including at least 48 credits in course work. A maximum of 24 credits of course work (with grades of “B” or better) from a Master’s degree program may be allocated toward the doctoral degree. The minimum CMPP Graduate Program requires:

CMPP Core Curriculum	46 required course credits (see below)
Electives	2 credits electives (600 or 700 level)
Dissertation	<u>24 credits</u>
Total credits required	72 credits

The specific program of study is determined by the student and his or her Advisory / Examination Committee. The following courses (47 credits) are required by the CMPP Graduate Program unless waived by the student’s Advisory / Examination Committee and the Executive Committee:

BCH 705	Molecular Genetics	3 credits
CMB 710	Molecular Cell Biology	4 credits
PCB 711	Systems physiology	7 credits
PHAR 710	Molecular Pharmacology	3 credits
PHAR 725	Ethics and Scientific Research	2 credits
CSH 780	Biostatistics in Public Health	3 credits
CMPP 740	Neuroeffector Pharmacology	3 credits
CMPP 770	Research Rotation	6 credits
CMPP 790	Seminar	6 credits
CMPP 794	Journal Club-Colloquium	6 credits
CMPP	Independent Study/Qualifying Exam	3 credits
CMPP 795	Comprehensive Exam	1 credits

In addition to these courses, a Ph.D. student must take at least 2 graduate credits of electives selected by the student and the Advisory / Examination Committee.

Common choices are:

BCH 613	Molecular Biophysics	3 credits
PHAR 750	Molecular Mechanisms of Excitability	3 credits
PHAR 730	Intro to Imaging & Optics	3 credits
PHAR 770	Reproductive Pharmacology	3 credits

*Year 1:*

Appendix B provides a copy of the *CMPP Student Guide* that is given to all new students. The end of this document illustrates a sample program of study for the typical student admitted for the fall semester. During the first year, the Program Director and Executive Committee advise the CMPP student. The curriculum is designed to provide the student with basic to

advanced knowledge in molecular genetics (BCH 705), systems physiology (PCB 711) and molecular and cell biology (CMB 710), and to allow him or her to get familiarized with research in the laboratory by undertaking two rotations (CMPP 770) in different laboratories, one in each semester. These rotations are intended to expose students to the range of research in the CMPP Graduate Program and to aid in the selection of an advisor just before the beginning of his or second year of study. It should be pointed out that the student is not obliged to carry out his or her dissertation in either one of the two laboratories where the rotations took place. During each of the fall and spring semesters of the first three years, the CMPP student has to enroll in “Seminar” (CMPP 790) and “Research Round” (CMPP 794) classes. The student is allowed one credit per semester to attend all seminars presented at the School of Medicine. The objective of this course is to expose the student to other state of the art areas of research and broaden his or her general knowledge. “Research Rounds” are an important facet of their training and comprise two academic components. Mandatory attendance to seminars given by 2<sup>nd</sup>, 3<sup>rd</sup> or 4<sup>th</sup> year CMPP students; it is expected that during the course of their training, each CMPP student will give at least one Research Rounds seminar reporting the results of their experiments. The second component is their active participation in one journal club per semester; it is of course anticipated that they present at least one paper for discussion. The overall objective of this class is to develop communication skills and critical thinking. The representative list of recent journal clubs and associated coordinator that they can choose from is the following:

<u>Journal Club</u>	<u>Coordinator</u>
• MicroRNAs and Disease	Dr. Seungil Ro (Physiology)
• Proteomics	Dr. Heather Burkin (Pharmacology)
• Cardiovascular Health and Disease	Dr. Yumei Feng (Pharmacology and Physiology)
• Neurodegeneration and Physiology)	Dr. Ruben Dagda and Thomas Gould (Pharmacology)
• Posttranslational Modifications	Dr. Patricia Berninsone (Cell Biology)
• Translational Research in Muscle Disease	Dr. Dean Burkin (Pharmacology)
• Virology and Infectious Disease	Dr. Subhash Verma (Immunology)
• Neurogenetics	Dr. Alex Keen (Biology)

#### *Year 2:*

During the fall semester, the student enrolls in Molecular Pharmacology (PHAR 710) where he or she will be introduced to classical pharmacology and to advanced methods used to investigate drug interactions at the cellular and molecular levels. The CMPP graduate program and the Department of Pharmacology offer possible elective courses for the students to choose



from, one offered per year and each given every three years. These specialized graduate courses are team-taught and are designed to provide specialized training in specific areas of the research carried out by CMPP faculty which include a comprehensive description of ion channels (PHAR 750), human reproductive pharmacology (CMPP 770), and an introduction to fluorescence and imaging approaches (PHAR 730).

At the end of the second year, the student must prepare and pass a Qualifying Exam consisting of a written research proposal and oral examination by the Advisory/Examination Committee in order to be a candidate for a Ph.D. degree. Students are required to enroll in CMPP 795 in the spring semester of the second year of study. Failure to complete the Qualifying Exam will result in an Incomplete in this course. Given the amount of work required to prepare for this exam, the program adopted a new policy in 2005 following a recommendation from the Curriculum Committee that the student enroll in an Independent Study course (CMPP 793) for which the student would earn credits for preparing the written part of the exam. The exam consists of writing a grant proposal that must follow the standard NIH format for a multi-year RO1 grant (not more than 13 pages, single-spaced, etc.). It must include (suggested page limits):

1. Title Page
2. Abstract (1 page)
3. Specific Aims (1 page)
4. Background and Significance (3-4 pages)
5. Preliminary Studies (optional)
6. Research Design and Methods (6-8 pages)
7. Human Subjects or Vertebrate Animals (as appropriate)
8. Literature Cited

The proposal should not include personnel, budget or facilities pages. The topic must be approved by the Advisory / Examining Committee before the student begins writing. The proposal can be an extension of the student's current research problem if it represents a significant advance or novel approach to the problem. It cannot be the same as a research project described in any grant submitted by the advisor or collaborators. Resources that may be consulted include the library, PubMed, the Advisory / Examining Committee, other researchers and other students. The finished document must be the student's own work.

The student's doctoral committee formally examines the student orally on the proposal. If the grant proposal is not considered acceptable, a revised grant proposal is due two months from the date of the first examination. If the student fails the second examination he or she will be dismissed from the program. This exercise is viewed as an important component of the student's training and education. To pass the exercise, students need to be well versed in the current literature in their field, and be able to formulate and defend their research plan and methodology. Students are also expected to answer questions about the principles and factual basis of the research being proposed as well as any principles and facts of biomedical science that the committee feels the student should know to advance to candidacy. This exam introduces the student to the style, complexities and nuances of the grant proposal process and begins to develop those skills necessary for obtaining extramural research grants and for defending their ideas before other scientists. In order for a student to pass the Qualifying Exam, the Advisory/Evaluation Committee must reach a consensus that the student has written an acceptable proposal and performed satisfactorily in the oral examination. This consensus is provided to the Program Director. If the Committee cannot reach such a consensus, they may offer the student the opportunity to revise the written proposal, to repeat the oral examination, or both within a period determined by the Committee. Alternatively the Committee provides the Program Director with a written summary of the student's performance in Qualifying Exam, course and research work and a recommendation that the student be dismissed from the Ph.D. program. The Program Director and Advisory/Evaluation Committee decides if the student's work merits awarding a Master's Degree or if the student should be dismissed from the CMPP Graduate Program. The final decision is forwarded to the Graduate School. Per Graduate School policy, students cannot continue in the CMPP Ph.D. program without passing the Qualifying Exam.

#### *Years 3 and 4:*

As the student progresses, a few more elective courses are taken when offered to eventually meet the minimum requirement of 48 course credits. During one of those two years, the students are obliged to enroll in the Ethics and Research course (2 credits; PHAR 725), which is offered every other year. This is a mandatory CMPP graduate course that is also a requirement of all students supported by NIH sponsored awards. This course is coordinated by the Department of Pharmacology and deals with a number of important ethical topics in research including

plagiarism and falsification of data, intellectual property, conflicts of interest, etc. Alleviation of course work allows students to spend more time in the laboratory to carry out their experiments and work on their dissertations.

Below is a detailed description of each of the courses mentioned above as they appear in the UNR catalog or in a more comprehensive format on specific the Molecular Biosciences and CMPP websites (<http://www.unr.edu/molecular-biosciences> & <http://www.unr.edu/molecular-biosciences/degrees-and-admissions/cmpp>).

A. Mandatory CMPP Courses:

*PCB 711: Systems Physiology (7 credits):*

Principles of pulmonary, renal, gastrointestinal, endocrine, and cardiovascular physiology.

*BCH 705: Molecular Genetics (3 credits):*

Molecular view of prokaryotic and eukaryotic genes. Structure, expression and regulation of genes. Genetic engineering.

*CMB 710: Molecular Cell Biology (4 credits):*

Essential elements of cell structure and function. Comprehensive and experimental approach to the molecular view of the cell.

*CMPP 770: Research Rotation (1 to 6 credits):*

Research practicum. Maximum of 6 credits. Limited to CMPP majors.

*CMPP 790: Seminar (1 credit):*

Reports of current research. Maximum of 8 credits. Limited to CMPP majors.

*CMPP 793: Independent Study (1 to 6 credits):*

Intensive study of a special problem tutored by an instructor. Maximum of 6 credits.

*CMPP 794: Colloquium (1 credit):*

Presentation and analysis of original research (Research Rounds and Journal Club). Maximum of 8 credits.

*CMPP 795: Comprehensive Examination (1 credit):*

Reports of current research. Maximum of 8 credits. Limited to CMPP majors.

*PHAR 710: Molecular Pharmacology (3 credits):*

This course details the development of our current understanding of receptor signal transduction in mammalian systems. This course is designed for graduate students earning the Ph.D. and interested in careers in biomedical research and development in academia or industry. The course focuses on the molecular biochemistry of receptor structure; mass action considerations governing ligand-receptor binding interactions; molecular pharmacology of transduction of the receptor signal and specific considerations of receptors as pharmaceutical targets. Intended for Molecular Biosciences graduate students pursuing a specialization in pharmacology, this lecture-based course employs computer-based exercises to teach data analysis and interpretation. Students use the original scientific literature from a reading list provided.

*PHAR 725: Ethics and Scientific Research (2 credits):*

A student-led forum in which ethical issues associated with the conduct of scientific research are considered in detail. Limited to students seeking Master's or PhD's.

*CMPP 740: Neuroeffector Pharmacology (3 credits):*

This advanced graduate level course focuses on the molecular biological, biochemical and biophysical characteristics of neurotransmission including neuromuscular pharmacology and autonomic pharmacology, and methods and current problems applied to the study of neuroeffector systems controlling nerve and muscle activity. The team-taught course begins with lectures on the general principles of neurotransmission, followed by specialized topics that cover neurotransmitter release and storage, co-transmission, post-synaptic transmission, neurotrophic factors, localized and global  $\text{Ca}^{2+}$  signaling mechanisms, signal transduction through phosphorylation by various kinase and phosphatase classes, nitrergic and integrin signaling, regulation of ion channel activity, molecular mechanisms involved in store-operated  $\text{Ca}^{2+}$  entry, structural biology, and principles underlying long-term depression (LTD) and potentiation (LTP). This class is open to all graduate students who have obtained instructor approval.

B. Electives offered by local departmental or interdisciplinary programs:

*PHAR 770 Reproductive Pharmacology (3 credits):*

This graduate level course provides a substantive background in reproductive physiology and explores recent pharmacological developments in reproductive biology. This course covers the hypothalamic/pituitary axis, steroid hormone biosynthesis, regulation, sites and mechanisms of action, spermatogenesis and sperm transport, oogenesis and the menstrual cycle, male and female contraception and infertility, fertilization and implantation, maternal recognition of pregnancy, placentation, gestation, fetal sexual differentiation, regulation of puberty, and genetic disorders affecting the reproductive system. Students explore the pharmacotherapy of gynecological disorders such as endometriosis and polycystic ovarian syndrome, as well as drugs used in managing fertility and infertility, hormone replacement, and reproductive cancers. The effects of adiposity, environmental toxins, and various drugs on the reproductive axis are also discussed. This class is open to all graduate students who have completed introductory Pharmacology or Physiology courses and obtained instructor approval.

*PHAR 730: Introduction to Imaging and Optics (3 credits):*

Theory and practical aspects of microscope-based techniques currently used in research in both the life and physical sciences. Limited to students seeking Masters or Ph.D. degrees. Same as BME 730.

*PHAR 750: Molecular Mechanisms of Excitability (3 credits):*

This course focuses on the molecular biological, biochemical and biophysical characteristics of voltage- and ligand-gated ion channels, and other ion transport proteins in a variety of excitable cells. The course begins with a description of basic cable theory, conventional electrophysiological techniques and classical "Hodgkin & Huxley" analysis of ion channels in axonal membranes and trace the development of new biophysical and molecular biological methods for the study of ion channels. Individual lectures from experts from within and outside the institution then focus on studying the different classes of ion channels, including potassium, sodium, calcium and chloride channels. The objective is to describe the physiological and pharmacological function of each type of ion channel and to examine the relationship between biophysical properties and protein structure. Finally, several classes will examine the ionic basis

of excitability in selected types of excitable membranes, including nerve, cardiac, skeletal and smooth muscle. This class is open to all graduate students who have completed introductory Pharmacology or Physiology courses and obtained instructor approval.

*BCH 613: Molecular Biophysics (3 credits):*

Molecular basis of structural biology and biological catalysis; protein, membrane and polysaccharide conformation; supra molecular assembly; enzyme kinetics; molecular recognition.

## **II.6 Administrative Structure of the Program and Its Relation to Department Structure:**

The administrative structure of the CMPP program was explained in detail in section I.3 above. Because of the alternating governance of the program between the Departments of Pharmacology, and Physiology and Cell Biology, the administration of the program has been operated in the department of the acting director. Since January of 2014 (term ending December 31, 2009), Dr. Dean Burkin in Pharmacology has served as Program Director and he has been assisted by Mrs. Debbie Elwell whose salary was supported by the Dept. of Pharmacology. Dr. Burkin receives a stipend of \$1,341/year that is based on a formula established by the university, factoring in workload, personnel supervision, etc. From 2008 until the end of 2010, the Department of Physiology and Cell Biology used similar financial sources to administer the program.

## **II.7 Advising and Mentoring Procedures:**

Upon completion of the second rotation, each student selects a Dissertation Advisor who will serve as chair of his or her Advisory/Evaluation Committee. The Dissertation Advisor must agree to take the student on and will be responsible for supporting the student's research and providing a stipend consistent with CMPP guidelines. Students who are unable to identify a willing mentor at the completion of the second rotation will be advised by the members of the Executive Committee over the summer following the first year of study. If a mentor cannot be found, the Committee provides the Program Director with a written summary of the student's performance in course and research work and may recommend that the student be dismissed from the Ph.D. program. This latter situation has not occurred during the seven years under review.

The Advisory/Examining committee consists of at least five members of the Graduate Faculty: the Committee Chair / Permanent Advisor, at least two members of the CMPP Graduate Program, at least one faculty member from a department in a field related to the student's major, and at least one graduate faculty member representing the university at large. Students may request the appointment of a qualified faculty member from another university or from a relevant discipline or profession. The Graduate Dean makes formal approval of the student's advisory/examining committee. The Advisory/Examination Committee normally holds an initial meeting prior to or early in the fall semester of the second year of study. The committee approves the Qualifying Exam (CMPP 795 and CMPP 793), the program of study, and the dissertation. It also conducts the formal oral part of the doctoral dissertation defense and serves in an advisory capacity to the student during his or her tenure in the CMPP program. The student and committee meet annually to prepare a written progress report consisting of a list of the courses the student has taken, the courses proposed for the next year, and the tentative date for the Qualifying Exam. This report will be turned in to the Executive Committee.

Prior to choosing a date for the final oral examination, graduate students must submit a copy of their final dissertation for review by their examining committee. The dissertation does not have to be in its final form, but must contain sufficient information to allow their committee to make an informed decision about the state of completion of their studies. The purpose of the review is to discern whether a student has sufficiently completed their studies to schedule the public seminar and final examination.

The format of the dissertation must meet the requirements of the Graduate School. If a student has first author publications accepted in refereed journals, the student may solicit the committee to use these publications together with an appropriate introductory chapter in lieu of the standard dissertation format. The committee may determine that additional chapters are required along with the published papers.

Following acceptance of the dissertation by the Advisory/Examination Committee, all doctoral candidates in the CMPP program will schedule and present a public research seminar on their dissertation research. This seminar will constitute part of the final examination and must be presented while the candidate is still in residence. Following the public seminar, the Advisory/Examination Committee will conduct a final oral examination in closed session. This oral examination will be conducted in accordance with the examination requirements of the

Graduate School. Doctoral candidates may register for one credit of Independent Study during the semester in which this seminar is presented.

## **II.8 Combined MD/PhD degree program**

The University of Nevada School of Medicine (UNSOM) provides opportunities for medical students to complete a combined MD/PhD degree through the CMPP graduate program. This program is administered through the offices of Dr. James Kenyon, Dr. Cheri Singer, Dr. Melissa Piasecki and Dr. Dean Burkin at UNSOM. Students interested in this program contact Dr. James Kenyon and/or Dr. Dean Burkin who provide guidance on the requirements of this program. The admissions committee consists of Dr. James Kenyon, Dr. Cheri Singer, Dr. Melissa Piasecki and Dr. Dean Burkin. Medical students are required to have outstanding MCAT scores, a high pass in the majority of blocks the student has taken within the medical school curriculum, a strong interest and/or background in biomedical research and three outstanding letters of reference. Students enter the CMPP graduate program after completing their first 2 years within the medical school. Medical students can transfer up to 24 credits from their medical classes towards the PhD degree. Students then complete the remainder of the classes within the CMPP program and select a mentor laboratory within which to complete a thesis. This normally takes 2-3 years after which the student defends their dissertation. Students then complete clinical years 3 & 4 within the medical school clinical program. From 2008-2015 one student successfully completed an MD/PhD combined degree. Currently the program has one student in progress towards a combined MD/PhD degree.

## **II.9 CMPP Program Statistics:**

The CMPP program currently lists 32 faculty members, 11 of which currently supervise 1 to 3 CMPP students ( $2.3 \pm 1.6$  (SD) students/advisor). Since 2008 there were 22 students admitted to the CMPP program. From 2008 to 2015 there were 27 students that completed their Ph.D.'s (75% completion rate), 5 students converted to a Master's degree in the CMB program (14% conversion to Master's degree rate) and 4 students dropped out (11% drop out rate). There are 17 students currently in progress towards completing their Ph.D.'s. Since 2008, 27 students graduated from the CMPP program with a Ph.D. in an average of  $4.8 \pm 1.0$  (SD) years. Of the 17 Ph.D. students currently enrolled in the program there are 4 students (2015 cohort) in their 1<sup>st</sup> year that have not yet selected a laboratory. Most CMPP faculty who are not currently



supervising a student have done so in the last seven years and/or have served on student advisory committees and/or CMPP committees. In 2008, the program listed 26 faculty members so there has been a net gain of 6 faculty members (23% increase). It should be mentioned that 10 new faculty members joined our program during the past seven years but the program lost 4 due to various reasons. Detailed profiles of CMPP faculty and graduate students are presented in sections below.

**The CMPP Graduate Student handbook is available in Appendix B**

### **III. PROFILE OF CMPP GRADUATE STUDENTS**

#### **III.1 Description and Analysis of Recruiting and Admissions Procedure:**

The University of Nevada, Reno is an Equal Opportunity/Affirmative Action employer and does not discriminate on the basis of race, color, religion, sex, age, creed, national origin, veteran status, physical or mental disability, or sexual orientation, in any program or activity it operates. Application for admission to the CMPP graduate program occurs through the Molecular Biosciences Interdisciplinary Program (<http://www.unr.edu/molecular-biosciences/degrees-and-admissions>). Applications are received and processed through the Graduate School of the University of Nevada, Reno. Applicants indicate their program of interest (CMPP, CMB or Biochemistry) during the application process. During the first year applicants can change between the programs. The application is required to include Graduate Record Examination (GRE) scores and official transcripts of all previous undergraduate and graduate work. In order to be considered by the Admissions Committee applicants must meet all requirements established by the Graduate School (<http://www.unr.edu/grad>) including at least a 3.0 undergraduate grade point average (4-point system). Applicants that have English as a second language are required by The Graduate School to take the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) score of at least 550 (paper version), or 79 (internet version) or IELTS 6.5 (academic version). Applicants are expected to have a B.A. or B.S. in Biology, Biochemistry, Molecular Biology, Chemistry or similar discipline. Further information and application forms are available from the Molecular Biosciences website (<http://www.unr.edu/molecular-biosciences/degrees-and-admissions>), (Graduate School (<http://www.unr.edu/grad>), the Office of International Students and Scholars (<http://www.unr.edu/oiss/>), and the CMPP Program website (<http://medicine.nevada.edu/cmpp>).

Application for admission to the CMPP Graduate Program must be made to the Molecular Biosciences Interdisciplinary Program and Graduate School of the University of Nevada, Reno. In addition to official transcripts and various test scores, the program also requires that three letters of recommendation supporting the applicant be sent to the Graduate School. Some flexibility is allowed in the evaluation of the applicant (e.g. research experience could compensate for slightly lower GRE scores, outstanding letters of recommendation, etc.). GRE test scores are required to be within the last 5 years. Applicants should have a combined GRE

score of 300 (under the new GRE scoring system since 2011) or better to be considered for admission to the program.

All completed applications received by the due deadline (January 15<sup>th</sup>) are evaluated and ranked by the Admissions Committee. The top five (or more if funding permits) candidates are interviewed by the Admissions Committee in person or by phone. After a final review, the Admissions Committee sends the final list of top ranked student to the Program Directors for Biochemistry, CMB and CMPP. Based on the number of stipends available, the Directors make recommendations to the Graduate School for admission. In the last three years, GA stipends were provided by the Graduate School (2), the School of Medicine (2), and the Departments of Pharmacology (1), and Physiology and Cell Biology (1). In addition GTA stipends are provided by the VPRI office, Graduate School and Departments of Biochemistry and Cell Biology. Many CMPP faculty interested in supervising a student have picked one or more candidates from time to time and asked the Admissions Committee to render a decision as to whether the student meets all requirements for admission in our program. In other cases, the students have specifically contacted CMPP faculty because of their interest in the specific research program of the investigator. The stipend for the first year of training for those so-called “buy-in” students was provided to the program by the CMPP faculty through his or her personal grant funding.

Over the last three years the number of applications to the Molecular Biosciences program has been:

2013: 48 applications

2014: 89 applications

2015: 71 applications

The CMPP program has benefitted from the International Student Program (see Section II.3 above) with several institutions in Great Britain, in particular with Northern Ireland. Students are also locally recruited through promotion efforts by some CMPP faculty participating in team-taught undergraduate classes in Biology and Biochemistry. Informing these undergraduate students about the CMPP program, the faculty and the research programs often led to the recruitment of excellent summer students as well as students undertaking their senior thesis in a CMPP laboratory (two semesters during the 4<sup>th</sup> year; 6 credits). As for the International Student Program, these efforts helped in selecting and stimulating the best candidates to become CMPP students.

The Graduate School has participated in several Graduate Student Fairs organized by neighboring western states. The Graduate School promotes all its graduate programs to students interested in the CMPP program.

In August 2015 the Graduate school initiated a digital marketing test campaign for doctoral programs to assess the benefits of such an approach in recruiting students. The program implemented inquiry forms on graduate programs including the CMPP and MB programs and launched paid media advertisements on Google AdWords. The test ran from 7/5/2015 to 8/8/2015 and we generated 249 inquiries from prospective PhD students, with 87 coming from paid traffic and 160 coming from non-paid sources (mostly organic traffic from Google searches). The test has revealed we do have a market to use online media channels to engage with prospective doctoral students and the targeting and marketing continues to need refinement.

### **Major takeaways**

- Develop a back-end tracking and conversion system to assess quality and measure application and enrollment yield
- Develop a better understanding of the student markets for individual graduate programs
- Align recruiting cycles to application deadlines, student interest, and available assistantship funding lines
- Because of fantastic organic inquiry conversion rates, continue to focus on increasing traffic to our degree pages and optimizing user experience on those pages
- Conduct a deep dive into international markets, as they present a major area of opportunity for student recruitment

### **GradFIT – Fully Inclusive Training for Diverse Graduate Students**

In 2015, the University of Nevada, Reno Graduate School and the Office of Diversity Initiatives collaborated to expand the GradFIT program based on the success of the pilot program offered in 2014. GradFIT was created to increase the enrollment of students from historically underrepresented backgrounds in graduate programs at the University of Nevada, Reno. The program introduced students to the opportunities, challenges and expectations of graduate school as well as preparing them for the graduate school application process.

In June 2015, GradFIT was expanded from a 3-day to a 4-day intensive boot-camp style program encompassing three academic programs: 1. life sciences, 2. psychology, behavioral and

social sciences, and 3. creative and liberal arts. The program accepted students from the following undergraduate majors. GradFIT continued its previous collaboration with Nevada State College, but also expanded to include undergraduate students from California State University (CSU), Chico, CSU Sacramento, and the University of Nevada, Reno. Students from these universities were asked to submit an online application and were then selected to participate in the program based on the student's grade point average, class standing, and answers to submitted essay questions. Once the selection process was completed, a total of 32 students were selected, with six from CSU, Chico, nine from CSU, Sacramento, nine from Nevada State College, and eight from the University of Nevada, Reno. These 32 students all self-identified as being first generation, low income and/or from historically underrepresented backgrounds. The program was offered at no cost to the students. The University of Nevada, Reno (UNR) funded full room and board for students while they were on the UNR campus whereas the other participating institutions (CSU, Chico, CSU, Sacramento and NSC) paid for transportation to and from UNR. The program commenced on June 1, 2015 and ended on June 4, 2015.

The students experienced a series of activities and informational sessions all with the purpose of preparing them for future graduate studies. The sessions covered several topics including:

- Faculty lectures given by University of Nevada, Reno faculty
- Tours of facilities and laboratories by University of Nevada, Reno faculty
- Tour of campus and graduate housing
- Workshop on preparing for the Graduate Record Exam (GRE)
- Presentations on graduate admissions and graduate assistantships
- Workshop on communicating with potential faculty advisors and writing a personal statement
- Interactive workshop on careers and financial management
- Panel discussion with graduate students

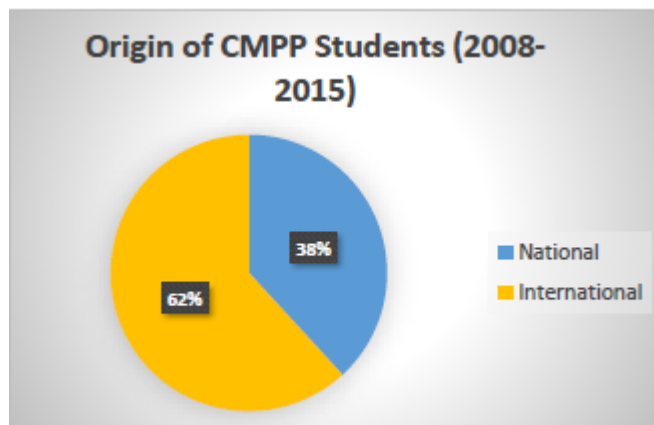
GradFIT will continue to expand on an annual basis, with the aim of serving more students from historically underrepresented backgrounds in their pursuit of graduate education at the University of Nevada, Reno and elsewhere.

### III.2 Quality, Number and Diversity of Students:

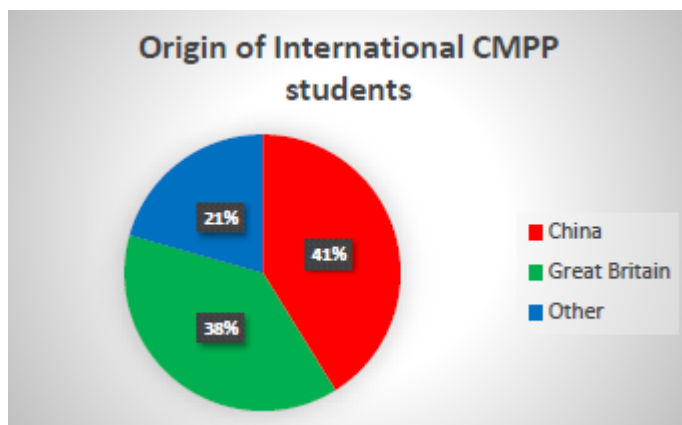
Appendix C shows a detailed profile analysis of all CMPP students who have graduated and/or been admitted in the program since 2008. The table shows the name of the student, the years of admission and graduation, graduation time in years, the college and location where undergraduate training has taken place, the field of the Major, GPA, and GRE scores for verbal (V), quantitative (Q) and analytical (A). We extracted data from this Table to examine the profile trends of our student cohorts since 2008. Figure 2 shows that 62% of our students came from abroad.

The study shows 38% of the international students came from Great Britain and were attracted at the undergraduate level through the International Student Program initiated by Dr. Sean Ward (Section II.3 above). About 41% of the international students were from China. The rest (21%) of the international students came from Mexico (1) and Iran (1) (Figure 3). Clearly our program can be defined as diverse in terms of the origin of the students.

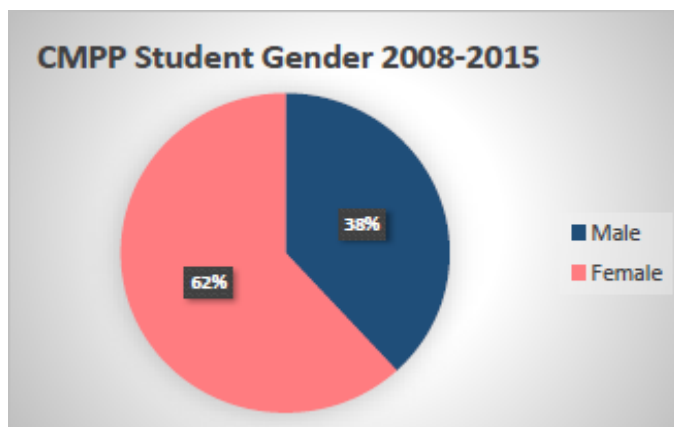
Figure 4 reveals that 62% of students admitted to the CMPP program from 2008 to 2015 were female and 38% were male.



**Figure 2:** National or International CMPP Students Who Have Graduated and/or Were Admitted in the Program since 2008.



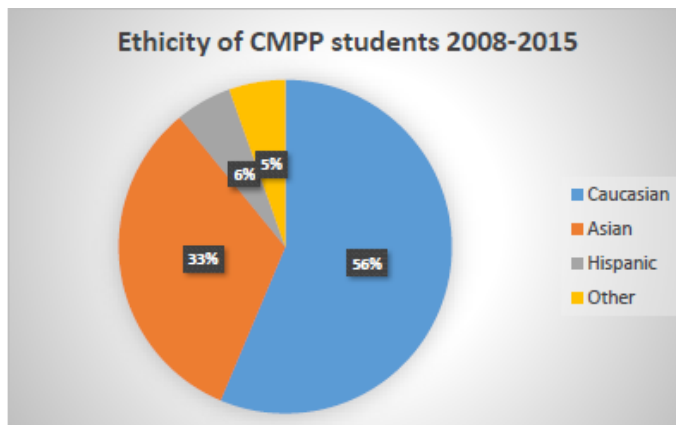
**Figure 3:** Origin of All CMPP Students Who Have Graduated and/or Were Admitted in the Program since 2008.



**Figure 4:** Gender Profile of All CMPP Students Who Have Graduated and/or Were Admitted in the Program since 2008.

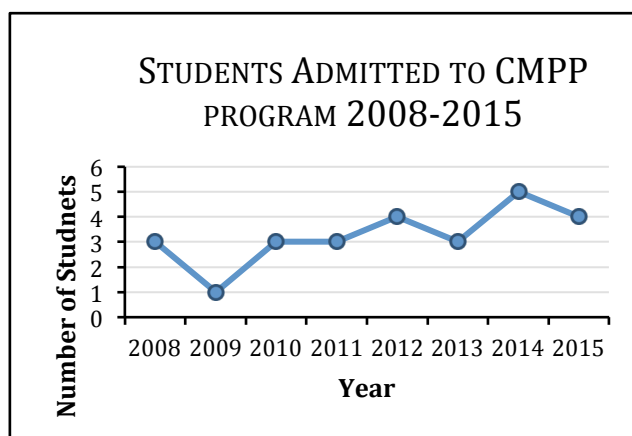
This is an interesting change compared to the previous review in which approximately 50% of students admitted were male and 50% female.

Figure 5 shows 56% of students admitted were Caucasians and 33% were Asians. Other ethnic groups represented were Hispanic (3), or Middle East (2). Special recruiting efforts have been implemented such as GradFit to attract African Americans and Hispanic Americans, who are represented in the population of the State of Nevada and are clearly still underrepresented.



**Figure 5:** *Ethnicity of All CMPP Students All CMPP Students Who Have Graduated and/or Were Admitted in the Program since 2008.*

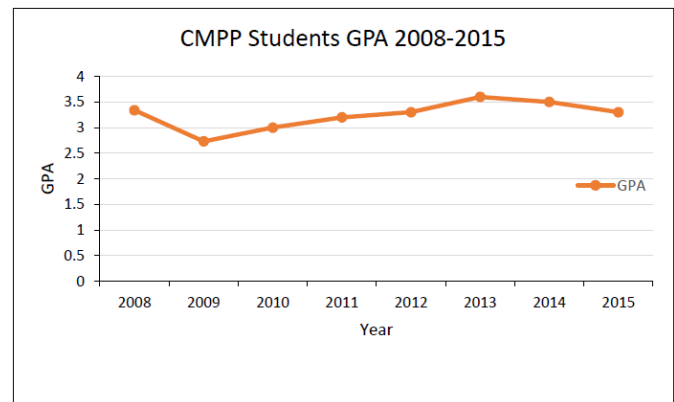
Figure 6 shows that the number of CMPP students admitted in the program from 2008 until 2015. In 2009 there was only one student admitted to the program. We believe this represents the down turn in the economy in both the US and Nevada and the reduced investment in science and technology. From 2010 there has been a steady increase in students admitted to the program. This parallels with the increasing number of CMPP faculty and the high level of success of CMPP faculty to obtain funding from extramural agencies (Section IV).



**Figure 6:** *Number of Admitted CMPP Students per Year since 2008.*

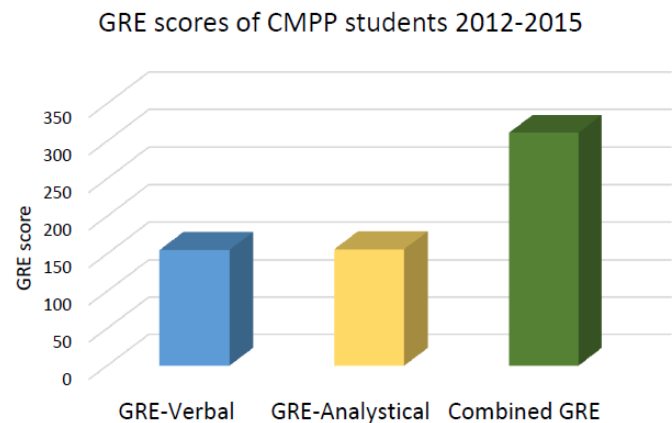
Analysis of the students who were admitted reveals that their academic performance and intellectual skills remained relatively constant over that period. An average Grade Point Average (GPA) for students that have graduated or been recruited during 2008-2015 was 3.37 $\pm$ 0.4. The annual average GPA for students is represented in Fig. 7.

The Graduate Examination (GRE) test changed the scoring system in 2011. From 2012-2015 the average GRE verbal scores were 155+/-5 and average analytic scores were 156+/-4 with a combined average score of 311+/-7. The mean GRE scores for students admitted to the program from 2012-2015 are represented in Figure 8. A comparative analysis of their performance relative to students from other



**Figure 7:** Mean GPA Scores of all admitted CMPP Students since 2008.

institutions is given further below. These results show that over the last three years students admitted into the CMPP graduate program on average meet the minimal requirements of the program with combined GRE scores of >300.



**Figure 8:** Mean GRE scores for all admitted CMPP students since 2011-2015

**A summary of CMPP graduate student profiles are available in Appendix C.**



### III.2.1 Quantitative and Qualitative Measures of Student Research Output:

In order to provide a comparison of the performance of our CMPP students with students from similar programs the Directors of Interdisciplinary Graduate Programs at other institutions were contacted and asked if their program recently conducted a self-study recently and if they would be willing to provide the report. Dr. Burkin contacted the following Program Directors in October, 2015:

1. Cheryl Maslen, PhD, Professor, Knight Cardiovascular Institute, Department of Molecular and Medical Genetics, Director, Program in Molecular and Cellular Biosciences, Oregon Health and Science University, Portland, OR (**OHSU**).
2. Anita L. Zimmerman, Ph.D., Professor and Vice Chair, Molecular Pharmacology, Physiology & Biotechnology (MPPB) Director, MPP Grad Program, Brown University, Providence, RI (**BU**).
3. Dr. David Peacock, Professor in Molecular Genetics and Microbiology, Director of the Biomedical Sciences Graduate Program (BSGP), University of New Mexico, NM (**UNM**)
4. Domann Frederick, PhD, Professor, Radiation Oncology, University of Iowa, Iowa City, IA.
5. Heddwen Brooks, PhD, Chair and Professor of Physiological Sciences, University of Arizona College of Medicine, Tucson, AZ
6. Art Weber, PhD and Susanne Mohr, PhD, Associate Professor of Physiology, Director of Research and Graduate Studies, Department of Physiology, Michigan State University, East Lansing, MI.
7. Joan Brown, PhD, Distinguished Professor and Chair, Department of Pharmacology, University of California, San Diego, CA (**UCSD**)

**Table 3.** *Comparison of Performance of CMPP Students with those Enrolled in Oregon Health and Science University (OHSU), Boston University (BU), University of California, San Diego (UCSD) and University of New Mexico (UNM)*

Index	CMPP	OHSU	BU	UCSD	UNM
Graduation time (Years)	4.8	5.5	5.5	5.6	5.5

<b>Dropout or converted to Masters (students/year)</b>	1.0	1.2	0.2	0.2-0.3	n/a
<b>Average GPA</b>	3.37	3.54	n/a	3.59	n/a
<b>GRE Verbal</b>	154	156	157	497*	518*
<b>GRE Quantitative</b>	156	156	154	621*	663*
<b>GRE Analytical Writing</b>	4.2	4.1	4.0	5.0	4.3
<b>Publication rate</b>	100%	98%	99.9%	n/a	75%
<b>Number of Publications/student</b>	4.5	n/a	3.7	n/a	3.8

**\*Old scoring system (up to 2012) for GRE reported**

The statistics for the CMPP program compare well with other similar graduate programs. The graduation time for CMPP students was only 4.8 years which is less than students at OHSU, BU and UNM. The dropout rate or students converting to Masters was 11% (or ~1 student per year) in the CMPP program compared to other programs at OHSU, BU and UNM. Students admitted to the CMPP program had similar GPA's and GRE scores compared to those admitted to programs at OHSU, BU and UNM. In terms of publications, CMPP students had higher average number of publications compared to students at OHSU, BU and UNM. Also all graduates from the CMPP program had at least one publication. These data show that CMPP students performed at or above the level of students in comparable programs.

### **III.3 Historical Trends in Graduate Student Assistance:**

Graduate Assistantships (GA) and Graduate Teaching Assistantships (GTA) through the Molecular Biosciences Graduate Program have supported CMPP students over the past seven years. As explained above, 1<sup>st</sup> year students have been supported by GAs or GTAs provided by the Graduate School, School of Medicine and both founding departments, as well as individual investigators. Due to the increasing availability of GTA's through the graduate school, and departments within the MB program, more CMPP students are required to TA during their first year. GA's for all additional years have and will continue to come from extramurally supported grants awarded to CMPP faculty. Because of the heavy course load (48 course credits out of 72) for the completion of a Ph.D. at UNR, CMPP faculty feel that students do not spend enough time in the laboratory to carry out their project and become proficient scientists. Although there are

clear academic benefits of teaching undergraduate students, having students serving as TAs would further limit the essential time required for them to become competitive young investigators seeking a post-doctoral position in academia or a research position in the industry, and would unwisely lengthen graduation time.

#### **III.4 Enhancement of Academic Courses through Seminar Series, Internships, Study Abroad, etc.:**

As part of the curriculum, all CMPP students must attend seminars presented at the School of Medicine sponsored by the different basic science departments and graduate programs. Many students have visited the laboratories of other investigators at other institutions to learn new techniques, which were brought back to UNR and greatly contributed in helping the research carried out by other CMPP faculty. Finally all students have had the opportunity to improve their communication skills in science by attending international meetings such as the Biophysical Society, Experimental Biology, Neuroscience, American Heart Association and other important meetings. Many students also presented their work locally by attending the annual **George G. Bierkamper** Graduate Student Retreat held every August the week before the Fall semester.

#### **III.5 Extent of Student Participation in Program Governance and Curriculum:**

As part of the suggestions in the previous report, student participation in the program has included surveys on what improvements students would like to see in the program. Students have provided input through these surveys on the nature and content of the curriculum. These have been reported to the CMPP executive committee which has led to the development of the Systems Physiology course, modification of numbers of credit hours for certain courses and moving course availability to meet the needs of the students.

#### **III.6 Assessment of Academic Advising in the Program:**

As described in Section II.7, the Advisory/Examining committee consists of at least five members of the Graduate Faculty: the Committee Chair / Permanent Advisor, at least two members of the CMPP Graduate Program, at least one faculty member from a department in a field related to the student's major, and at least one graduate faculty member representing the university at large. CMPP Advisory Committees provide a lot of input in the project outlined by the immediate supervisor of the student. This has been extremely beneficial to the student,

insuring that he or she works on a study that will move forward in a timely fashion for graduation and to generate high quality publications. Although having one or more 1<sup>st</sup> author publications at the end of the Ph.D. is not a requirement of the Graduate School or the CMPP program, nearly all Advisory Committees have strongly supported the notion that students should complete their degree with at least one 1<sup>st</sup> author publication. The high level of success of academic advising can be appreciated by examining the career progression of our recent graduates (see Table 4) and excellent track record of our students. This is largely attributable to the great success of CMPP faculty at obtaining highly competitive extramural grant support at the federal level (Section IV below), their recognized international reputation, and not least the high degree of interdisciplinary and collaborative work taking place between CMPP laboratories from which the students benefit by widening their array of skills.

### **III.7 Summary of the Program's Advisement Policies and Procedures for Resolution of Any Student/Advisor Conflicts:**

The CMPP program does not have specific guidelines for resolution of Student/Advisor conflicts. Over the last seven years, only a few such cases surfaced. Only three conflicts were brought to the attention of the current Program Director. The general approach was to talk to each party individually to find out the nature of the conflict and whether the conflict can be resolved in the best interests of parties involved. Consultation was extended to members of the Advisory Committee and Executive Committee. In the cases above the conflicts were resolved with this approach. One student recently successfully graduated, the second student changed advisors and then decided to complete a Master's degree while the third is continuing on in the program after changing primary Advisors. Clearly this remains a difficult area and further additions and amendments to the current Policies and Procedures with a clear policy regarding how Student/Advisor conflicts should be resolved given priority in the near future.

### **III.8 Summary of Graduates over the Last 7 years and their Employment History:**

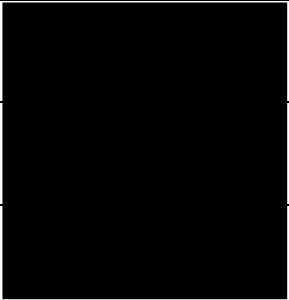



Table 4 below show the employment history of all CMPP graduates from 2008 to 2015. One student from the program has gone to medical school, one is completing medical residency as part of her MD/PhD degree and one graduate is now a patent attorney. All others have found positions in academia or the industry related to their graduate training at UNR. Fourteen are

postdoctoral fellows; two are senior scientists at large companies; five are Assistant Professors, Lecturers or instructors at a college and one is now a plant pathologist.

**Table 4.** *Career Progression of CMPP Graduates (2008-2015)*

<b>Name</b>	<b>Former Mentor(s)</b>	<b>Date Defended</b>	<b>Position</b>
	Duan	4/28/08	Postdoctoral George Washington University  <b><u>Current Position</u></b> Senior Scientist Janssen Pharmaceutical Companies of Johnson and Johnson
	Burkin	11/07/08	1. Postdoctoral University of Nevada School of Medicine  2. Postdoctoral NIH/NINDS [REDACTED]
	Burkin	12/13/07	Postdoctoral Scripps University, San Diego, CA  <b><u>Current Position</u></b> Associate Director ScienCell Research Laboratories [REDACTED]
	Duan	9/17/08	Postdoctoral University of California San Diego  <b><u>Current Position</u></b> Associate Study Director Pharmacological Studies Jackson Laboratories [REDACTED]
	Von Bartheld	4/30/09	Postdoctoral University of Nevada, Reno [REDACTED]
	Hume	11/10/09	Research Associate Brandeis University Boston, MA [REDACTED]
	Koh	9/11/08	Research Assistant Professor University of Nevada, Reno
	Smith	9/30/10	Postdoctoral University of Wisconsin-Madison
	Smith	3/12/09	Postdoctoral University of Washington, Seattle [REDACTED]

	Ward	7/23/09	Instructor University of Washington, Seattle [REDACTED]
	Koh	10/28/09	Postdoctoral University of Nevada School of Medicine  <b>Current Position</b> Medical Student (4 <sup>th</sup> year) University of Birmingham United Kingdom [REDACTED]
	Sanders	11/9/10	Research Associate Birth Defects Research Centre, University College London Institute of Child Health [REDACTED]
	Yan	4/27/11	Plant Pathologist Nevada Department of Agriculture [REDACTED]
	LeBlanc	7/8/10	Attorney, Cochran Freund and Young, Denver, Colorado [REDACTED]
	LeBlanc	10/18/12	Postdoctoral University of Arizona [REDACTED]
	Baker	9/22/14	Postdoctoral University of Nevada School of Medicine [REDACTED]
	Von Bartheld	4/26/11	Postdoctoral Southern Medical University Guangji Hospital, Guangdong, China
	Perrino	5/18/09	Resident Internal Medicine USC Medical Center, Los Angeles, CA.
	Yan	7/20/11	Postdoctoral UC Berkeley [REDACTED]
	Perrino	7/13/12	Postdoctoral Purdue University [REDACTED]
	Ward	3/28/13	Postdoctoral University of Nevada School of Medicine
	Keef	4/21/11	Lecturer University of Nevada School of Medicine [REDACTED]
	Burkin	7/18/11	Adjunct Biology Professor Truckee Meadows Community College [REDACTED]
	Yan	4/27/12	Research Associate UCSF

	Mutafova-Yambolieva	8/5/13	Postdoctoral University of Nevada School of Medicine 
	Smith	4/25/13	Postdoctoral University of Nevada School of Medicine 
	Burkin	8/6/14	Postdoctoral University of Nevada School of Medicine 

**A summary of CMPP graduate student publications are available in Appendix D.**

## IV. PROFILE OF CMPP FACULTY

### IV.1 Faculty Composition:

Table 5 below lists all of our current CMPP Faculty and includes their name, country of origin, rank, affiliation, hire date, tenure status, degrees held, gender, ethnicity and discipline specialties. A brief (most are NIH style biosketches) or complete C.V. of each faculty has been provided to the External Review committee.

**Table 5.** *Profile of Current CMPP Faculty Members*

Name	Country of Origin	Rank Title	Affiliation	Hire Date	Tenure	Degrees	Gender	Ethnicity	Training and Expertise
Angermann, Jeffery	U.S.A.	Assistant Professor	Dept. Community Health Sciences Sch. Med.	07/13	Track	Ph.D.	M	Caucasian	Clinical and Environmental Physiology, Environmental Health and toxicology, applied chemistry and biology
Baker, Josh	U.S.A.	Associate Professor	Dept. Biochem. & Mol. Biol. Sch. Med.	07/01/04	Track	Ph.D.	M	Caucasian	Biochemistry, Biophysics and Molecular Biology, Molecular Mechanisms of Muscle Contraction, Myosin
Burkin, Dean	New Zealand	Professor	Dept. Pharmacol. Sch. Med.	03/01/03	Yes	Ph.D.	M	Caucasian	Biochemistry, Cell Biology, Developmental Biology, Genetics, Mouse Transgenics, Integrin Signaling, Muscular Dystrophy, High throughput drug screening
Burkin, Heather	U.S.A.	Assistant Professor	Dept. Pharmacol. Sch. Med.	07/01/13	Track	Ph.D.	F	Caucasian	Molecular and Cellular Biology Physiology and Pharmacology of Myometrium, Preterm labor
Buxton, Iain L. O.	England	Professor and Chair	Dept. Pharmacol. Sch. Med.	04/01/85	Yes	Pharm.D.	M	Caucasian	Molecular and Clinical Pharmacology Physiology and Pharmacology of Myometrium, Premature Delivery, Breast Cancer
Craviso, Gale Louise	U.S.A.	Professor	Dept. Pharmacol. Sch. Med.	07/01/90	Yes	Ph.D.	F	Caucasian	Pharmacology, Neuroscience, Regulation of Catecholamine Biosynthesis and Release, Biological Effects of Electromagnetic Fields on Excitable Cells
Dagda, Ruben	Mexico	Assistant Professor	Dept. Pharmacol. Sch. Med.	01/20/13	Track	Ph.D.	M	Hispanic	Mitochondrial pathobiology, Neurodegenerative diseases, Pharmacology and Cell biology
Duan, Dayue	People's Republic of China	Professor	Dept. Pharmacol. Sch. Med.	06/04/96	Yes	Ph.D.	M	Asian	Cardiac Physiology and Pharmacology, Proteomics, Electrophysiology, Ion Channels, Ischemia-Reperfusion Injury
Earley, Scott	U.S.A.	Associate Professor	Dept. Pharmacol. Sch. Med.	07/01/13	Yes	Ph.D.	M	Caucasian	Pharmacology and Physiology of TRP channels in arterial tone
Feng, Yumei	People's Republic of China	Assistant Professor	Dept. Pharmacol. Sch. Med.	07/01/15	Track	M.D. Ph.D.	F	Asian	Pharmacology and Physiology of pro-renin receptor in neural regulation of blood pressure
Gould, Thomas	U.S.A.	Assistant Professor	Dept. Physiology & Cell Biol. Sch. Med.	07/01/13	Track	Ph.D.	M	Caucasian	Physiology and Cell Biology of Schwann cells in neuromuscular junction development and function
Harvey, Robert	U.S.A.	Professor	Dept. Pharmacol. Sch. Med.	07/01/08	Yes	Ph.D.	M	Caucasian	Pharmacology and Cell Biology of cAMP compartmentalization



<b>Hennig, Grant</b>	Australia	Research Assistant Professor	Dept. Physiology & Cell Biol. Sch. Med.	08/1/99	No	Ph.D.	M	Caucasian	Physiology and Pharmacology, Enteric Neurobiology, Computer Imaging and Software Development
<b>Keef, Kathy</b>	U.S.A.	Professor	Dept. Physiology & Cell Biol. Sch. Med.	07/01/87	Yes	Ph.D.	F	Caucasian	Physiology, Neurophysiology Control of Vascular and GI Motility; Voltage-gated Ca <sup>2+</sup> Channels
<b>Keene, Alex</b>	U.S.A	Assistant Professor	Dept. Biology		Track	Ph.D	M	Caucasian	Genetics, animal models, circadian rhythm, energy metabolism and behavior
<b>Kenyon, James</b>	U.S.A.	Senior Assoc. Dean for Research & Professor	Dept. Physiology & Cell Biol. Sch. Med.	08/01/87	Yes	Ph.D.	M	Caucasian	Physiology & Biophysics, Electrophysiology, Ion Channels, Calcium Signaling in Neurons
<b>Koh, Sang Don</b>	South Korea	Professor	Dept. Physiology & Cell Biol. Sch. Med.	11/10/96	Yes	M.D. Ph.D.	M	Asian	Physiology, GI Physiology, Electrophysiology of Bladder and GI Smooth Muscle, Stretch-Activated Channels
<b>Leblanc, Normand</b>	Canada	Professor	Dept. Pharmacol. Sch. Med.	8/01/02	Yes	Ph.D.	M	Caucasian	Physiology, Biophysics, Cardiac and Smooth Muscle Electrophysiology and Excitation-Contraction Coupling, Calcium-Activated Chloride Channels
<b>Mastick, Cynthia</b>	U.S.A.	Associate Professor	Dept. Biochem. & Mol. Biol. Sch. Med.	7/01/98	Yes	Ph.D.	F	Caucasian	Biochemistry, Insulin, Diabetes, Caveolin Phosphorylation, Caveolae
<b>Mastick, Grant</b>	U.S.A.	Professor	Dept. Biology	07/01/98	Yes	Ph.D.	M	Caucasian	Biochemistry and Molecular Biology, Regulation of Gene Transcription, Developmental Neurobiology,
<b>Mutafova-Yambolieva, Violeta</b>	Bulgaria	Professor	Dept. Physiology & Cell Biol. Sch. Med.	12/17/97	Yes	M.D. Ph.D.	F	Caucasian	Physiology and Pharmacology, Autonomic Physiology and Pharmacology; Autonomic Control of Cardiovascular System, Neurotransmitter Release and Removal, Hypertension
<b>Peacock, John</b>	U.S.A.	Professor	Dept. Medicine & Physiology Sch. Med.	07/01/80	Yes	M.D. Ph.D.	M	Caucasian	Medicine, Neurology & Neuroanatomy Alzheimer's Disease, Acetylcholinesterases, Hippocampal Sclerosis
<b>Perrino, Brian</b>	U.S.A.	Associate Professor	Dept. Physiology & Cell Biol. Sch. Med.	4/01/96	Yes	Ph.D.	M	Caucasian	Biochemistry and Molecular Biology, CaMKII, Calcineurin, Phospholamban, GI Smooth Muscle Physiology
<b>Rendon, Robert</b>	U.S.A.	Research Assistant Professor	Dept. Physiology & Cell Biol. Sch. Med.	06/01/13	No	Ph.D.	M	Caucasian	Physiology and Cell Biology of trafficking of synaptic vesicles and pre-synaptic plasticity of synapses
<b>Ro, Seungil</b>	South Korea	Associate Professor	Dept. Physiology & Cell Biol. Sch. Med.	07/01/11	Yes	Ph.D.	M	Asian	Physiology and Cell Biology of microRNA's in smooth muscle cell plasticity
<b>Sanders, Kenton M.</b>	U.S.A.	Professor & Chair	Dept. Physiology & Cell Biol. Sch. Med.	8/01/82	Yes	Ph.D.	M	Caucasian	Physiology and Biophysics, GI Physiology and Pathophysiology, Control of GI Motility, Electrophysiology, Pacemaker Mechanisms in Smooth Muscle
<b>Singer, Cherie</b>	U.S.A.	Associate Professor Associate Dean for Student Affairs	Dept. Pharmacol. Sch. Med	07/01/01	Track	Ph.D.	F	Hispanic	Pharmacology and Physiology of microRNA's in Asthma and smooth muscle plasticity

<b>Smith,</b> Terence K.	Australia	Professor	Dept. Physiology & Cell Biol. Sch. Med.	6/01/95	Yes	Ph.D.	M	Caucasian	Mathematics, Solid State Physics, Neuropharmacology, Origin and Neural Control of Slow Wave Activity in Smooth Muscle
<b>Van der Linden,</b> Alexander	Netherlan ds	Assistant Professor	Dept. Cell Biology	07/01/09	Yes	Ph.D.	M	Caucasian	The Biology and regulation of Gene expression and Role of Circadian clocks
<b>Von Bartheld,</b> Chris	Germany	Professor	Dept. Physiology & Cell Biol. Sch. Med.	7/01/97	Yes	M.D.	M	Caucasian	Neurosciences, Neuroanatomy, Developmental Neurobiology, Molecular Neurobiology, Neurotrophic Factors, Axonal Transport
<b>Ward, Sean</b>	Northern Ireland	Professor	Dept. Physiology & Cell Biol. Sch. Med.	12/01/87	Yes	Ph.D.	M	Caucasian	Physiology, Cellular Morphology, Gastroenterology and Motility, Pacemaker Mechanisms in GI and Reproductive Tract Smooth Muscle
<b>Yan, Wei</b>	People's Republic of China	Professor	Dept. Physiology & Cell Biol. Sch. Med.	4/01/04	Yes	M.D. Ph.D.	M	Asian	Reproductive Biology and Endocrinology, Molecular Biology, Micro-RNAs

Table 6 below shows the overall profile of our faculty.

**Table 6.** *General Profile of CMPP Faculty (2015)*

	%
Female (7/32)	22
Caucasians (25/32)	78
Asians (5/32)	16
Hispanics (2/32)	6
U.S. Born Citizens (14/32)	53
Permanent Residents of the USA	39
Research Assistant Professors (2/32)	6
Assistant Professors (7/32)	22
Associate Professors (6/32)	19
Professors (17/32)	53

## IV.2 Faculty Workloads:

The faculty allocation of responsibilities in the program for teaching, mentoring and advising, and graduate committee or administrative work have been explained in details in Section I above when describing the administrative structure of the program. It should be

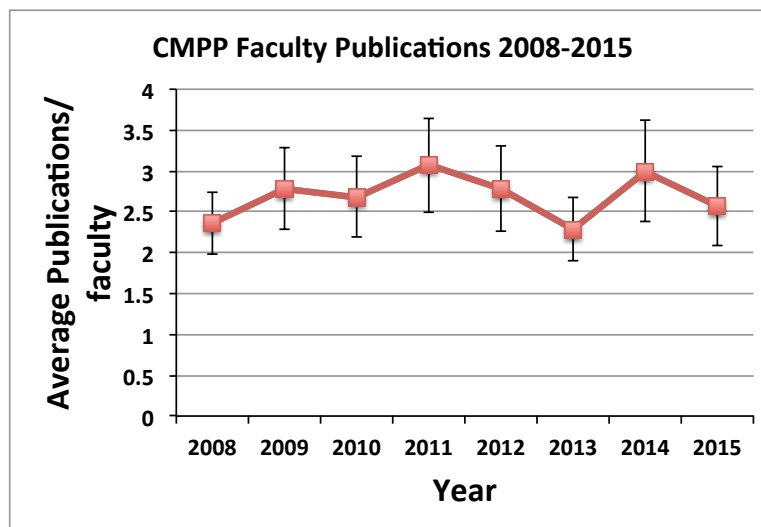
emphasized that the School of Medicine does not perceive the participation by the School of Medicine CMPP faculty in graduate program activities as a valued service because their primary mission is to train medical students. All CMPP faculty thus participate on a voluntary basis and with dedication to the success of the program. With the exception of the stipend provided by the Graduate School to the Program Director, the program is administered entirely by funds provided by extramural agencies, predominantly the NIH awarded to CMPP investigators. Because of the demonstrated success of the program, more funds should be allocated to support the activities of the program.

### IV.3 Faculty Searches:

The CMPP program has no control over faculty searches as departments and schools dictate new hires. However, CMPP faculty in the founding departments, have often voiced their opinion in selecting new candidates and whether they would complement our graduate faculty.

### IV.4 Research, Scholarship, Creative Activity, Outreach, and Professional Service:

CMPP faculty have been extremely productive both in terms of quantity and quality in the last seven years, publishing a total of 600 publications (including 2015 submissions),  $22.2 \pm 3.4$  publications/faculty (SEM; n=28), most in high impact journals (see Appendix G for the complete list of publications by all current faculty)

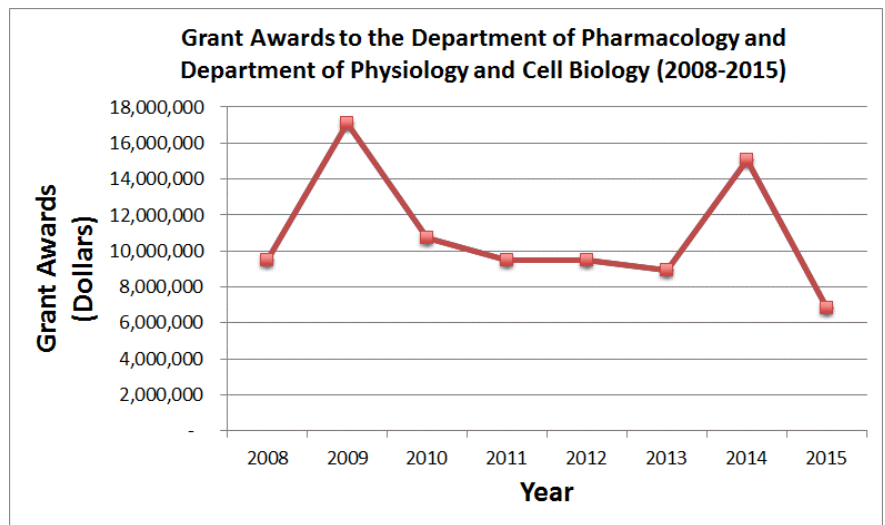


**Figure 8:** Mean publication rate for CMPP faculty from 2008-2015

including Nature Genetics, PNAS, Human Molecular Genetics. Figure 12 demonstrates the sustained productivity of CMPP faculty over the last seven years, with an average of ~2-3 publications/year/faculty.

**A summary of CMPP faculty publications are available in Appendix E.**

CMPP faculty have been very successful in obtaining extramural funding bringing in over \$87M in direct and indirect funds to UNR over the last 7 years. Figure 9 shows the trend for total funding within the Department of Pharmacology and Department of Physiology and Cell Biology. From 2008 to 2009 grant funding dramatically rose, which then stabilized to around \$10M between 2010 and 2013. In 2014 there was another sharp increase in grant funding.



**Figure 9:** Total Funding of CMPP Faculty from the Departments of Pharmacology and Physiology and Cell Biology from 2008 to 2015.

In 2015 funding was down compared to the previous 7 years although all data for 2015 may not be available for this study. The increases in funding observed in 2009 and 2014 coincides with program grants, COBRE and INBRE funding. In addition the success of CMPP investigators in obtaining RO1 grants in 2009 and 2014 are also reflected in the numbers. **Grant awards and periods of funding for each award are listed in Appendix F.**

The recruitment of graduate students has been closely tied to availability of extramural grant funding, since graduate students are supported by grants to PI's from Year 2 onwards. Within these figures are indirect costs received by the UNR which amount to between 40 and 43.5% of the totals. This means significant indirect costs are received by UNR and UNSOM. It has to be noted that these funds are often obtained by research performed by graduate students with the labs of CMPP faculty. The comparison therefore of Table 7 below in which there is a precipitous decline in University and State support for the CMPP program is deeply concerning. **It raises many questions concerning the use of indirect funds and institutional support of the program.** Are these funds supporting other programs and being directed away from the CMPP program? If the CMPP program received more indirect funds would the program be able to support more graduate students to further improve funding? Is it time for UNSOM and UNR to invest more in this very successful program so that it can become more nationally and internationally recognized? These are valid questions raised by CMPP faculty and need to be addressed given the significant extramural grant funds that are represented within the program.

## V. PROGRAM RESOURCES AND FACILITIES:

### V.1 **Funding Sources to Support the Program Activities:**

Most CMPP laboratories are located within the School of Medicine, and a small number of labs are housed in the Dept. Biology (2), College of Science (3). All faculty are either tenured or are on a tenure-track position supported by partial to full FTEs. The salaries of CMPP faculty and operating budgets for the maintenance of offices and laboratories are provided by the State of Nevada.

The Program Director receives an annual stipend of \$1,341 from the Graduate School. The stipend to the Program Director is included in the annual budget. Funds are also set aside to support a few invited speakers and, on occasion, to partially defray the cost of web-based advertisements of the program and costs associated with students requiring a third rotation. Over the last several years the School of Medicine through the office of the Senior Associate Dean for Research, Dr. James Kenyon, has provided \$50,000/year to support two stipends. In 2015 Dr. Kenyon provided an additional stipend to support a third CMPP student. **These student stipends are used to support students only in their 1<sup>st</sup> year.** The Department of Pharmacology has supported the salary of Ms. Debbie Elwell who has served as the Administrative Assistant for the program. Dr. Mridul Guatam, VPRI and Dr. David Zeh, Dean of the Graduate School have provided funds to support Ms. Kathryn (Kayleigh) Burns to provide administrative support for the Molecular Biosciences Program.

The budget for the Molecular Biosciences Graduate Program is administered through the Graduate School with each program Director having signing authority on the account. This fund is used to cover 1<sup>st</sup> year graduate stipends, tuition waivers and the Retreat. Table 1 is data provided by the Graduate School showing the alarming decrease in ICR and state funds that are being contributed to the program. In 2015 the contributions are only 19% of the 2008 high figure. Some of this is due to the downturn of the Nevada economy and impact on state contributions to UNR. In addition grant funding has been extremely tight from 2009 onwards with the recession. However more recently there have been improvements in the Nevada economy and increasing success rates in grants but this has not yet been reflected in the budget for this program. Considering a significant amount of grant funds are brought into UNR by CMPP faculty and students, there should be a major effort to increase the budget for the Molecular Biosciences Graduate Program.

**Table 7: Combined CMPP and CMB Operating Budget (2008-2015):**

Year	ICR Funds	State Funds	Total	Percent of Maximum
FY08	\$121,068.00	\$20,000.00	\$141,068.00	100%
FY09	\$110,925.00	\$10,000.00	\$120,925.00	86%
FY10	\$102,453.00	\$10,000.00	\$112,453.00	80%
FY11	\$76,775.00	\$20,000	\$96,775.00	69%
FY12	\$96,378.00	\$20,000	\$116,378.00	82%
FY13	\$43,892.00	\$0	\$43,892.00	31%
FY14	\$36,744.00	\$0	\$36,744.00	26%
FY15	\$26,652.00	\$0	\$26,652.00	19%

In addition to providing the funding for necessary supplies and equipment for their research, the salary of CMPP students for all subsequent years of training has been solely supported by Federal and grants awarded to CMPP faculty. Table 7 shows that alarming decrease in the relative proportion of total funding (excluding research operating costs) for the last three years which shows that by far, individual grant awards of CMPP faculty and stipends provided by the two departments, represent the largest source of funding for our students.

## **V.2 Description and Analysis of the Adequacy of the Physical Facilities:**

In 2010 the Center for Molecular Medicine (CMM) building was opened providing state-of-the-art facilities for CMPP faculty and students. The CMM building is separated into two parts: (1) The basic science building which contains laboratory space and offices for CMPP faculty and houses the Dept. of Pharmacology, Dept. of Physiology and Cell Biology and Dept. of



Microbiology and Immunology. Students have desk space near the offices of CMPP faculty. (2) The clinical building, which has facilities for UNR clinicians to receive and treat patients.

The Center for Molecular Medicine also contains a state-of-the-art David Lupan auditorium (CMM111) used for CMPP seminars and CMPP student defenses and lectures. Next to this auditorium is the Atrium, which houses the Pathways Café providing lunches and coffee break areas for faculty and students. This area also contains meeting rooms utilized by CMPP students for committee meetings.

The Center of Molecular Medicine contains a dedicated 13,457 square foot barriered mouse facility that can house over 45,000 mice. This facility contains a 3,364 square foot state-of-the-art transgenic mouse facility including dedicated procedure rooms for mouse surgeries, microinjection, data management and cryopreservation. All mice derived from non-approved sources are re-derived by the Nevada Transgenic Center into the facility to maintain the specific pathogen-free status of the facility. Animals are continuously monitored for pathogens. The Nevada Transgenic Center is a full service facility providing assistance with targeting DNA construct development, embryonic stem cell electroporation, blastocyst microinjections, pronuclear injections, genotyping, karyotyping, breeding and maintenance of transgenic animals. The UNR office of Laboratory Animal Medicine administers and runs the Nevada Transgenic Center.

The services offered by Information Technology Department, Graduate School and the Office of International Students and Scholars (OISS) provide services to CMPP graduate students. Newly admitted students are given access to a UNR email account. Student applications and the procedures of admission are all processed online which greatly facilitate access to important data by the Program Director and his assistant. This system has allowed close monitoring of student profile and performance, and the status of class registration or visa processing for international students. Most courses coordinated by CMPP faculty take advantage of WebCampus and MyNevada that allows students to download syllabuses, reading materials and PowerPoint files, and in some cases to take web-based exams.

## **VI. FUTURE PLANS**

### **VI.1 Strengths and Challenges:**

The 2008-2015 Self-Study Report clearly demonstrates the success and strengths of the CMPP Graduate Program at the University of Nevada, Reno:

1. Students admitted in the program had GPA's and GRE scores that were similar to students in equivalent programs.
2. CMPP Students graduated more quickly than students enrolled in similar programs at other institutions.
3. The average publication record of CMPP students who graduated surpassed that of students enrolled in similar programs.
4. Nearly all CMPP students who graduated have either pursued their career in academia by undertaking postdoctoral training or have found a position in the industry. Some of our more senior students are now successful faculty members in universities and colleges.
5. Faculty members training these students have outstanding track records and have been very successful publishing and have obtained extramural funding from federal agencies in the public sector and private foundations even during a difficult funding climate.

The challenges of the program for the coming years are as follows:

#### **1. Recruitment:**

- a. Recruitment of US students: the proportion of U.S. applicants has increased but still should be higher. This is important for future plans to apply for NIH training grants.
- b. Recruitment of students from ethnic groups: our program recruited only two Hispanic students and still no African American students. How can we increase the pool of students admitted from these underrepresented ethnic groups, especially Hispanics who represent a significant fraction of the population of the State of Nevada?

#### **2. Funding:**

Although the economic climate of Nevada has improved considerably since the last program review, there are still many difficulties faced by especially by junior and some senior faculty in securing funding. Although CMPP graduate students get a tuition waiver,



they still have to pay the balance of tuition and fees from their stipend and grants. In addition CMPP faculty get no teaching credit from UNR Provosts Office or VPRI office in the form of FTE support for graduate education. Many questions are still raised by CMPP faculty including are grants obtained by program faculty subsidizing other programs? Since graduate students perform critical research that contributes to the success of grant funding, the CMPP program should receive more, not less support from the Provosts Office, VPRI Office and Graduate School to recruit and train more graduate students in biomedical and translational sciences.

## **VI.2 Projections:**

Historical data suggests continued national and international success of the CMPP graduate program. As part of the Molecular Biosciences interdisciplinary program, there is now a larger applicant pool and opportunities for CMPP faculty to recruit outstanding graduate students to their research programs.

Funding remains a critical concern for the program including available graduate assistantships. Although colleges and schools within the program have provided Teaching Assistantships these positions are more demanding on students who have to balance teaching undergraduates, research rotations and completing course work. Those students on Research Assistantships can concentrate on research rotations and completing course work. This does lead to comparisons between graduate students as to why some are required to TA while others do not. More equipoise needs to be developed around the fellowships and how students are credited with more work loads.

While the cost of living has increased and salaries for faculty and administrators have slowly improved, graduate students stipends have not changed for over 12 years. It is time for the Provosts Office, Graduate school and UNR and UNSOM to recognize that a cost-of-living increase for our CMPP graduate students is well overdue. This would also recognize the value UNR places on its graduate students. For the program this move would aid in recruitment efforts also improve the quality and number of applicants to the program.

## **VI.3 Specific Short- to Medium-Term Changes Planned for Program Improvement:**

- 1. Increase in Student Stipend:** The CMPP graduate student stipend is currently \$22,000 with 10% fringe per year and has remained at this level for more than 15 years. There has been no

cost of living adjustment. An increase in stipend to \$25,000 with 10% fringe per year would make the program more nationally and internationally competitive.

- 2. Seminar Program:** Inviting speakers from other institutions to present cutting edge research to CMPP faculty and students is critical for student and faculty training. In addition inviting speakers strengthens program ties with other institutions and provides opportunities for collaborations. The funds available in the Interdisciplinary Molecular Biosciences budget currently only allows for 9 invited seminar speakers per year. Therefore only 3 invited speakers can be funded through the CMPP graduate program for the entire year. This is not an adequate number of speakers to invite given the diversity of research conducted within the CMPP program. Increasing funding to allow more speakers to be invited by the CMPP programs is critical for program improvement.
- 3. Molecular Biosciences and CMPP Curriculum:** We have made significant progress in developing the MB and CMPP curriculum so CMPP students receive the necessary training in Physiology, Cell Biology and Pharmacology. Currently students need to complete 48 credits in courses. This more than half the degree and students are often continuing to take classes in their 3<sup>rd</sup> and sometimes 4<sup>th</sup> year. The program would like to have all required course work completed by the end of the 2<sup>nd</sup> year. Reducing the course requirement to 34 credits would allow us to achieve this goal so students can focus on their research, publications and grant writing.
- 4. Development of the MD/PhD program:** In this program we average between 0-2 students. Over the last 7 years only one student has graduated with a combined MD/PhD degree. This may involve the demands on students of a combined curriculum, interest in conducting biomedical research, financial demands of undertaking a combined degree or knowledge of the program. Further support in developing a clear fast-track curriculum for potential studies might attract more MD students to undertake a combined degree.