Self-Study of the Medicinal Chemistry Graduate (Ph.D.) Program, Spring 2008

Mission Statement

The mission of the department of Medicinal Chemistry is to conduct basic research related to the chemistry and biochemistry of drugs and related chemical entities, to teach in the professional and graduate programs and to provide service to the scientific community.

Faculty and Staff

There are six tenured or tenure-track faculty members with active research programs in the Medicinal Chemistry department, namely:

- Graduate Research Professor: Raymond J. Bergeron, Ph.D.
- Full Professors: Raymond G. Booth, Ph.D.; Margaret O. James, Ph.D.; Kenneth B. Sloan, Ph.D.
- Associate Professor: Carrie Haskell-Luevano, Ph.D.
- Assistant Professor: Hendrik Luesch, Ph.D.

Dr. James serves as department chair, Dr. Sloan as associate chair and Dr. Bergeron as graduate coordinator. The department office has three state-supported staff members, an office manager, Jan Kallman, a program assistant, David Jenkins and a senior fiscal assistant, Sarah Scheckner. Graduate student admissions are processed by Ms. Kallman and Mr. Jenkins as they arrive.

Faculty research and scholarly activities

All faculty members are actively engaged in research and supervision of graduate students. Five of the six faculty members are currently funded by external funding agencies including NIH, the American Heart Foundation, the American Diabetes Foundation, the Smithsonian, the Florida Department of Health and the US-Israel-binational Science Foundation, although all six have received external funding in the past five years. The average amount of total external funding brought into the department each year for the past five years (2003-2007) is $2,841,758. This is 37% of the total funding brought into the College of Pharmacy.

Two faculty members are currently full members of NIH study sections (Neuropharmacology study section, Booth; Synthetic and Biological Chemistry B, Haskell-Luevano) and other faculty members (Bergeron, James, Luesch) have served as ad-hoc members of study sections in the past five years. Several faculty members are currently or have recently been members of the editorial boards of journals in the biomedical or pharmaceutical sciences (Haskell-Luevano, James, Sloan). All faculty members publish their research and are well cited. Curriculum vitae of each faculty member are provided in Appendix 1.
Five of the six departmental faculty members teach in the professional pharmacy curriculum and all faculty members participate in didactic graduate courses. In the professional pharmacy curriculum, one faculty member, Dr Ken Sloan, coordinates all four professional courses and teaches 60% of the lectures in these courses.

Facilities

The department occupies laboratories on the 5th and 6th floor of the P-wing in the Health Science Center. The departmental NMR occupies a laboratory on the ground floor. This space was renovated in 2000 to an excellent standard for conducting research. Major instruments available to the department are the 400 MHz NMR, a newly acquired LC-MS/MS, scintillation counters, ultracentrifuge, fluorescence and UV-VIS spectrophotometers. Each faculty member has specialized instruments for his or her own research.

Space is currently of great concern as the programs of more junior faculty members are growing while senior faculty members are maintaining funding. Allocation of faculty research space in the Health Science Center is controlled by the office of the Vice President of the Health Sciences, largely on the basis of overall external funding to the College. Within the College of Pharmacy this is a guiding principle in the allocation of space, however there is also a tradition that each department receive similar amounts of space. Thus, although the department of Medicinal Chemistry has for many years attracted about 40% of the external research budget, the department has only about 30% of the space in the College research wing (P-wing) and none in the administration building (HPNP building).

Ph.D. program description.

The overall objective of the Ph.D. program is to educate students to become independent, critical-thinking scientists who can formulate hypotheses and conduct research in one or more aspects of the broad field of Medicinal Chemistry. To this end, the program incorporates didactic instruction, a seminar program and individual research under faculty supervision leading to an original dissertation.

Our educational goals are (i) to provide students with a broad training in medicinal chemistry covering drug design and discovery, organic chemistry, natural products, analytical chemistry, biochemistry, molecular biology, pharmacology, metabolism and toxicology (ii) to assist students in applying their didactic course material in a research setting and (iii) to assist students in developing skills necessary for future employment.

Recruiting

Our recruiting is largely through our web page and publications. Students who are interested in pursuing a Ph.D. in pharmaceutical sciences with an interest in medicinal chemistry or medicinal chemistry and toxicology contact us after finding out about our program through our web page or by reading our publications.
**Admissions process**

Students may submit an on-line or hard copy application to our Ph.D. program. Even for students who apply on-line, certain elements of the application such as letters of recommendation, application for a fellowship or assistantship, statement of purpose and copies of undergraduate transcripts and test scores must be submitted to the department in hard copy. It is our custom to print out the on-line application materials for review together with the submitted hard copy applications. As applications are received, the applicant’s credentials and supporting materials are entered into an excel spreadsheet and into folders. US citizens and permanent residents are identified and given preference for admission.

We admit students for the Fall or Spring semesters, although in practice most of our applicants are for the Fall semester. We do not offer students admission without an assistantship. Each year we determine how many openings we have for new Ph.D. students based on the number of assistantships available from the College of Pharmacy, whether or not we have applicants who could qualify for an Alumni scholarship, and which faculty members have funds available for graduate student support. Over the last five years (2003-2007 admission) we have had room for, and enrolled, two to five students per year.

In our January faculty meeting, we review the credentials of US citizen and resident applicants, to determine if any are eligible for special fellowships and to make early contact with promising students. It is our policy to contact all qualified US citizen or resident applicants, to find out if they have questions and to let them know we are interested in their application. The contact is made by Ms Kallman or a faculty member. Students with very good credentials, typically over 3.5 GPA and 1200 GRE will be offered a position immediately, and entered into the pool for additional scholarships. In February and March, we review any new US citizen and resident applicants, and all the other applicants, and rank them for the number of places we have and up to 3 alternates. Top candidates are contacted to find out if they have questions and to let them know we are interested in their application. We send letters of acceptance to the top-ranked candidates up to the number of positions available. The letters of acceptance contain a deadline in April, as agreed by other AAU universities for graduate admissions. If students do not accept by that date, and do not contact us for an extension, we offer the place to the next ranked student. We do not extend offers to students whose credentials do not meet our minimum standards (see below).

It is not our practice to invite prospective students to interview, however if they wish to visit us we arrange for them to meet several of the faculty and students.

**Student credentials**

Students with first degrees in chemistry, biology, pharmacy and related sciences apply to our program. In considering students credentials, we place most weight on GPA in chemistry, physics, mathematics and biology courses. The opinions of their professors as set out in letters of recommendation are taken very seriously, and we look for evidence of some research experience. The students’ personal statements are considered with
similar weight to the letters of recommendation. Scores in the GRE are given the least weight, although we rarely offer students a place if they have less than 1000 combined verbal and quantitative. Because the grade credentials of international students are not as easy to interpret, we give international students with a Masters degree preference over those without a Masters.

Table 1.
Qualifications of applicants to the Medicinal Chemistry Ph.D. program, 2002-2007

<table>
<thead>
<tr>
<th></th>
<th>GPA</th>
<th>GRE-verbal</th>
<th>GRE-quantitative</th>
<th>GRE-V+Q</th>
<th>Number of applicants (sex)</th>
<th>Ethnicity*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US applicants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied</td>
<td>3.48</td>
<td>446</td>
<td>634</td>
<td>1080</td>
<td>36 (17F, 19M)</td>
<td></td>
</tr>
<tr>
<td>Accepted</td>
<td>3.61</td>
<td>449</td>
<td>667</td>
<td>1116</td>
<td>23 (11F, 12M)</td>
<td></td>
</tr>
<tr>
<td>Enrolled</td>
<td>3.48</td>
<td>458</td>
<td>686</td>
<td>1144</td>
<td>8 (4F, 4M)</td>
<td></td>
</tr>
<tr>
<td><strong>International</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied</td>
<td>-</td>
<td>567</td>
<td>765</td>
<td>1332</td>
<td>188 Data not obtained</td>
<td></td>
</tr>
<tr>
<td>Accepted</td>
<td>-</td>
<td>594</td>
<td>765</td>
<td>1359</td>
<td>18 Data not obtained</td>
<td></td>
</tr>
<tr>
<td>Enrolled</td>
<td>-</td>
<td>573</td>
<td>759</td>
<td>1332</td>
<td>15 (8F, 7M)</td>
<td></td>
</tr>
</tbody>
</table>

* Afr-Am - African-American; As - Asian; Hisp - Hispanic; Cauc - Caucasian

**Sources of stipend funding**

All students in the Medicinal Chemistry pre-doctoral program are awarded a stipend and tuition waiver. The College of Pharmacy currently (2007-8) provides the department with funds for 8.5 teaching assistantships, which come with tuition waivers. The base stipend was recently raised (2006) from $14,000 to $17,500. Well qualified students are eligible to compete for an additional $3,000 per year for the first three years through the Grinter scholarship program. Extremely well qualified students can compete for an Alumni scholarship, which in 2007 carried a stipend of $25,000 + tuition. Two to three Alumni scholarships have been available per year for the whole College of Pharmacy over the past five years. Until this current year these scholarships have been awarded competitively to all College of Pharmacy departments. Over the past 5 years,
Medicinal Chemistry has been awarded three Alumni scholarships. Thus between 10 and 12 positions have been available from College of Pharmacy funding to the department. For the next few years we expect to receive College of Pharmacy funding for 8-9 TA positions, including the Alumni scholarship.

In the past five years some students have been supported (tuition and stipend) through a training core funded by NIEHS, other students have been awarded competitive American Heart Association fellowships and some students have been funded from faculty members’ grants. Departmental policy for allocating studentships is in the policies and procedures manual.

**Selection of mentor**

The graduate coordinator is the supervisor of a new student for the first semester, and ensures that each new student meets all faculty members and knows which faculty members are accepting new students. It is then up to the student to meet with a prospective mentor and his or her laboratory group, to decide on a mentor by the end of the first semester. The students are given a form which all faculty must sign, including the signature of the faculty member who agrees to mentor the new student. Some students accept admission on condition that they can work with a particular faculty mentor. If this is the case, and the faculty mentor agrees to accept the student, the new student will still meet each faculty member in their first semester, but may submit the completed form at any time in the first semester.

Over the past five years, the number of students supervised by any one faculty members has varied between one and four.

**Curriculum**

All students take the core curriculum didactic courses, which constitute 24-26 credit hours out of the 90 minimum credit hours (didactic + research) needed to graduate with a Ph.D. The courses in our core curriculum are reviewed annually and adjustments made if a majority of the faculty agree a change is needed. Students who have a Master’s degree can petition to waive up to 9 credit hours if they have taken equivalent courses at an accredited university. Details of the core curriculum are in the department graduate program manual (Appendix 2). Table 2 shows a sample progression through the program.
Table 2.

Sample curriculum for a student entering in Fall semester.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Credits</th>
<th>Year 2</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall semester</td>
<td></td>
<td>Fall semester</td>
<td></td>
</tr>
<tr>
<td>Basic Principles of Organic CHM 5224</td>
<td>3</td>
<td>Advanced metabolism BCH 6206</td>
<td>3</td>
</tr>
<tr>
<td>Organic Spectroscopy CHM 5235</td>
<td>3</td>
<td>Synthesis of Prodrugs PHA 5475</td>
<td>3</td>
</tr>
<tr>
<td>Drug biotransformation, PHA 6425</td>
<td>3</td>
<td>Research, PHA 6971</td>
<td>3</td>
</tr>
<tr>
<td>Seminar</td>
<td>Seminar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td></td>
<td>Year 2</td>
<td></td>
</tr>
<tr>
<td>Spring semester</td>
<td></td>
<td>Spring semester</td>
<td></td>
</tr>
<tr>
<td>Pharmacology GMC 7593</td>
<td>2</td>
<td>Structure determination of complex natural products, PHA 6356</td>
<td>3</td>
</tr>
<tr>
<td>Drug Design PHA 6447</td>
<td>3</td>
<td>Advanced molecular and cell biology BCH 6415</td>
<td>3</td>
</tr>
<tr>
<td>Supervised Research, PHA 6910</td>
<td>2</td>
<td>Research</td>
<td>3</td>
</tr>
<tr>
<td>Seminar PHA 6934</td>
<td>1</td>
<td>Seminar</td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>Didactic coursework normally completed – student eligible for qualifying exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer semester</td>
<td></td>
<td>Year 2 Summer and Remaining years</td>
<td></td>
</tr>
<tr>
<td>ICBR short course on molecular biology PHA 6522L</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistical methods in research STA 6166</td>
<td>4</td>
<td>Research</td>
<td>8-9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seminar</td>
<td>0-1</td>
</tr>
</tbody>
</table>

Exact courses will change depending on year of entry, and major professor.

Progression through the program

Supervisory committee and qualifying exam

Students form their supervisory committees at the time they are ready for the qualifying exam. As specified in the policies and procedures manual, this committee consists of at least three members of the Medicinal Chemistry department and at least one outside the department (who is usually outside the college). The timing of the qualifying exam is up to the major professor, but most faculty members advise their students to take the qualifying exam after they have finished coursework and have decided upon their dissertation research.

The qualifying exam consists of written and oral components. The first part is a written examination which includes take-home questions from each member of the supervisory committee, and can cover any aspect of Medicinal Chemistry. The second part relates to the students’ research. The student prepares a written research proposal consisting of an introduction, statement of hypothesis or objectives, methods to be used, preliminary results and literature references. The student presents this research proposal to his or her committee and answers questions on the research proposal or any other area of Medicinal Chemistry as the committee members see fit. If the student is deemed to have passed by the unanimous agreement of the committee, he or she progresses to candidacy.
Once they have passed the qualifying exam, students focus on research. When the supervisor thinks the student has completed enough work for a dissertation he or she may call the supervisory committee together to review the student’s progress and agree to a timetable for the defense. If there is no formal meeting, the student contacts each committee member and discusses research progress and the plans for preparing and defending the dissertation. Once the dissertation is written and distributed to committee members, the student presents a departmental seminar on his or her dissertation research. The dissertation defense follows this seminar.

Over the past five years, the average time to graduation in the department is 5 years.

**Teaching assignments**

All students assist in teaching for at least one year. The assignment most commonly consists of assisting in proctoring and grading exams in the professional pharmacy curriculum. Some students are assigned to skills laboratories for professional pharmacy students. Students paid solely with teaching assistantships must teach for their whole graduate career. Those who are subsequently paid from research funds, or who have obtained their own research fellowships, are not required to teach more than one year.

**Presentation of research at national meetings**

Students are encouraged to attend national meetings and present their research. The department offers scholarships of $500 towards the expense of attending a national meeting, providing the student is presenting a paper. In addition, the student may apply for a grant, typically in the amount of $300, from the Graduate School. Attendance at meetings is particularly advised for senior students, so that they may enroll in placement services and meet prospective employers.

**Presentation of research at the University of Florida**

The College of Pharmacy holds a research day each year in the Spring semester, at which there are competitions for the best oral and poster presentations by graduate students (as well as postdoctoral fellows and pharmacy students). This affords an opportunity for the students to present their research to their peers.

**Careers of graduates**

The department does not offer formal career guidance, but leaves it up to each faculty member to advise his or her students of the opportunities available. The department does not formally track the careers of our graduates, but faculty mentors encourage them to keep in touch. Many of our graduates take up a postdoctoral position in academia, government or the pharmaceutical industry immediately following graduation. Over the past 10 years we have had 36 Ph.D. graduates. Of these, 14 are in the pharmaceutical industry, 4 hold academic positions, 2 are in government agencies, 14 are still in academic or government post-doctoral positions and 2 returned to practicing pharmacy.
**Program assessment**

The Medicinal Chemistry faculty discuss the strengths and weaknesses of our graduate program on a regular basis at our monthly faculty meetings, and in more depth during our annual 1-day retreat. The graduate program undergoes periodic external peer review, as decided by College of Pharmacy and University of Florida administrators.

We consider that we offer a strong well-rounded program of instruction and the opportunity for a student to conduct research in most of the major areas of medicinal chemistry. We think our strengths are in our faculty members’ research credentials and programs, and in the availability of excellent support for research in the Health Science Center and other departments on campus. Most faculty members in Medicinal Chemistry collaborate with faculty in other departments or colleges, and this provides further opportunity for students to obtain a well-rounded education. As well as our departmental seminar program, which is geared towards helping our students with presentation and critical thinking skills, there are numerous seminar series in the health science center, which are widely advertised and available to all.

Our greatest perceived weakness is the size of the base stipend, which is lower than many of our peer schools. We are concerned that we will lose a College of Pharmacy stipend next year. Related to this is the steady erosion of NIH funding to support students, and a perception by faculty members that providing funding for a student is a less efficient use of research dollars than recruiting a post-doctoral fellow who can devote all their time to research. Another area of concern is the lack of space in the department for expansion of research programs.

**Sources of information**

- Annual reports of the faculty
- Annual report of the Office of Research and Graduate Studies
- Policies and procedures manual
- Admissions spreadsheets
Review of the Graduate Program  
Department of Medicinal Chemistry  
College of Pharmacy, University of Florida  

Peter A. Crooks, University of Kentucky  
William Gerwick, University of California San Diego  
Michael Duffel, University of Iowa  

March, 2008

STRENGTHS

Faculty:

The graduate program in the Department of Medicinal Chemistry at the College of Pharmacy, University of Florida, Gainesville has a good National reputation. The Department has a mix of faculty at various stages of their academic careers, including promising junior faculty, successful mid-career faculty, and eminent, seasoned faculty with national and international reputations. Some excellent hires of faculty by the Department, both historically and recently, have been made, which has had a very positive impact on the strength of the research programs. As a result, the faculty is universally research active with most having well funded research programs. All faculty are actively involved in the training of graduate students and post-doctoral fellows. The Medicinal Chemistry faculty research funding record is one of the strongest in the COP, and constitutes about one-third of the total extramural research funding for the COP. Several Medicinal Chemistry faculty members serve on NIH study sections, and several are editorial board members of scientific peer-reviewed journals.

Graduate Students:

The Department of Medicinal Chemistry has been able to consistently recruit good quality students into their graduate program, despite the extremely low graduate student stipend level. The COP is very generous in providing support to faculty for graduate student stipends, and up to 2 and 1/2 graduate students per faculty member can be state- or university-funded. In addition, graduate student tuition costs are borne by the COP. Most students either take positions in academia or in the pharmaceutical industry.

Department Infrastructure and Instrumentation:

The Department of Medicinal Chemistry has adequate infrastructure and good instrumental facilities to support their research program, and most faculty members have state-of-the-art instrumentation available for their research work. The campus NMR spectroscopy facilities are particularly impressive and this is a real strength of the University Health Sciences Center facilities.
Graduate Teaching Program:

The Department of Medicinal Chemistry graduate teaching program is generally well structured with a strong core course curriculum. The qualifying exam format is well organized and includes an evaluation of the dissertation research proposal of the student by the Ph.D. advisory committee.

WEAKNESSES, CONCERNS AND RECOMMENDATIONS

1. Space Issues and Recommendations

Finding: The External Advisory Review Team received consistent comments from the Department of Medicinal Chemistry Self Review document, the faculty, the Executive Associate Dean of the COP, and the Dean of the COP that lack of space for faculty growth as well as new faculty hires and increases in the number of graduate students is a major problem for the Department of Medicinal Chemistry. Two of these features (faculty growth vs. new faculty hires) operate in different time scales. The first of these involves current faculty with the issues becoming critical within the next 6-12 months; the latter issue will likely develop to significant proportions in the 5-8 year time framework, deriving in large part from the anticipated retirement of 3 senior faculty members within the department. Additionally, although the Department has eight Medicinal Chemistry faculty lines, only six are currently filled. However, the budget situation in the state, university and COP are such that these two unfilled faculty lines are not likely to be filled in the immediate future. While the Review Team strongly advocates for increasing the number of faculty within the Department to eight, the budgetary and space limitations make this a less approachable problem at the present time; alternatively, the short term space issues are of greater urgency and need to be addressed immediately, as described below.

Consistent with the excellent hires of faculty by the department, both historically and recently, the faculty is universally research active with most having well funded research programs. However, the space required to hire and house new research assistants/graduate students is simply not available within the two floors dedicated to the Department. The consequences of not allowing for growth of the new faculty are to put the COP and the university at grave risk of losing these faculty members to positions at other universities where space would be made available. The negative consequences of these potential faculty losses must be realized and fully appreciated by the Department, the COP and the university administration.

Immediate negative consequences of faculty losses due to shortage of space:

- Loss of the original start-up investment in these faculty
- Loss of time and effort spent in the original recruitment of these faculty
• Loss of grant funds currently held by these faculty, IDC and direct cost monies
• Loss of prestige in the national stage of academic pharmaceutical sciences
• Additional COP expenses required for new faculty recruitment and start-up
• Likelihood of difficulty to attract quality faculty due to damaged reputation
• Erosion in the research momentum currently enjoyed by the Department and the COP
• Loss of key personnel that should be in line to provide critical Departmental and COP leadership in a few years time

Recommendations:

• First and foremost, space that has been taken away from the Department of Medicinal Chemistry and ‘temporarily’ given to the Department of Medicine as swing space must be aggressively pursued by the COP administration for return to the department. This becomes especially critical with recent changes in senior administration within the Health Sciences.

• At the Departmental level, space allocation between the six current faculty members needs to be reviewed, and potentially adjusted. Currently, the formula for determining space appears to be loosely based on grant dollars, with the quoted formula being $268 to $300 per sq. ft. However, it was the perception of the Review Team that some spaces are under-utilized in terms of number of people per square foot whereas other areas are overcrowded to the point of becoming unsafe. Because laboratory personnel are funded from a variety of sources, including COP faculty lines (e.g. some faculty are laboratory active themselves), Departmental (TAs and other student fellowships), research grant funded personnel, unpaid undergraduate students paid from fellowships or earning academic credits), visiting scientists paid from non-university resources, there should be some integration of formulas, one based on grant dollars per sq. ft. and a second based on number of personal per sq. ft. Integration of these concepts could lead to some revisions in current space allocations within the Department, and thus relieve some of the overcrowding.

• It appears that the last meeting of the COP Space Utilization Committee was in 2004; this committee should be charged to meet on an annual or semi-annual basis, with the charge of reviewing and recommending space allocations to departments on the basis of COP goals and needs.

• The Review Team was told that space utilization is not regularly reviewed by the Executive Associate Dean. This review should occur annually or semi-annually, as well as on an as-needed basis. This review by the Executive Associate Dean should both identify needs/problems, and suggest solutions that would enhance the research and scholarly environment of the entire COP.

• At both the Departmental and COP level, an innovative approach needs to be applied to providing adequate space for current faculty and Ph.D. student growth (and retention). This may take the form of consolidating like facilities between
different departments into common space (e.g. storage, freezer farm, duplicated equipment, common room for shared instrumentation) as well as better utilization of space (e.g. change the use of storage rooms for higher priority purposes and then move these ‘storage’ items to spaces elsewhere on or off campus).

- It was the perception of the Review Team that a substantial amount of old, unused, and possibly non-functional instruments as well as old boxes, experimental apparatus and chemicals take up an unnecessary amount of space. A good cleaning out of these items could substantially increase the available work space.
- A lunch room or lunch room-like space (e.g. wide portions of hallways outfitted with couch/low table) needs to be created that is attractive and functional so that students can eat and/or drink there, and not in the laboratories. OSHA regulations prohibit eating and drinking in laboratory space, and hefty fines are levied on violators.

2. Graduate Student Issues and Recommendations

**Finding:** The Department of Medicinal Chemistry has a history of recruiting high quality students for admission to the Ph.D. program in Medicinal Chemistry despite the extremely low graduate student stipend level.

**Recommendation:** These high standards for admission should be maintained, while taking additional steps to improve the percentage of students who enroll from the pool of students who are accepted into the program. This currently stands at just over 33%, and has been mainly attributed to the very low graduate stipends offered to prospective graduate students.

**Finding:** The Department, College and Graduate School would like to significantly increase the number of graduate students in Medicinal Chemistry. This will require enhanced stipends, increased faculty numbers, increased availability of high quality research space, and improved recruitment strategies.

**Recommendation:** Recommendations regarding research space are elsewhere in this document. The Review Team recommends that the extent of current extramural funding success and potential for taking advantage of interdisciplinary opportunities on campus warrant the addition of two new faculty lines in the department. The Review Team also identified three potential sources of funding (i.e., COP, Graduate School, and NIH training grant) that should all be pursued for enhancement of stipend levels, and details are included below in a separate recommendation. In recruiting activities, it was recommended that the Department be encouraged to examine its website design to make it more informative to students. The website needs to be improved in content and attractiveness, and needs to provide additional information in areas such as graduate curriculum and progression through the program, current graduate students, and where
Ph.D. alumni of the Department are now. This is of critical importance, since it appears to be the COP’s major tool for graduate student recruitment.

**Finding:** Graduate student stipends are very low in relation to national benchmarks and local living expenses and the dollar amount is not competitive at the National level.

**Recommendation:** The graduate student stipends should be adjusted to be comparable to National benchmark levels. The Department should examine various mechanisms for the enhancement of stipends: 1) additional TA funds from the COP to enhance graduate recruitment; 2) use of Graduate School Alumni Scholarship funds to enhance multiple stipends in recruiting (e.g., if a single Alumni Scholarship of 20,000 were split into four supplemental fellowships of 5,000 each, this would bring four first year stipends to $22,500). Dean Frierson has recently changed Graduate School policies to enable splitting this fellowship into several supplemental fellowships to enhance stipends; 3) the Department is encouraged to explore initiating an NIH training grant application (perhaps in an area such as drug discovery) with involvement of an additional 10-12 NIH-funded PI’s from other departments (both within and outside the COP). The Graduate School will provide a commitment of one student for every 2 students on such a training grant to facilitate this.

**Finding:** There is a need for research career development opportunities for graduate students.

**Recommendation:** A team-taught research career development course at the collegiate level could take advantage of faculty expertise in the COP and elsewhere on campus to address topics such as resume writing, scientific publishing, grant writing, time management, interview skills, scientific meetings/networking, patents and intellectual property, and others.

**Finding:** Funds for graduate students to attend scientific meetings are not generally available.

**Recommendations:** The Review Team recommends that some full or partial travel scholarships be made available to graduate students who are presenting their research findings as either a podium presentation or a poster presentation at a National research meeting. These funds should be made available either by the COP or the Graduate School, or both.

**Finding:** Graduate students in Medicinal Chemistry feel somewhat isolated within the COP. Moreover, they do not appear to be optimally exposed to seminars from National and International leaders in the field.

**Recommendation:** An orientation session for incoming graduate students in Medicinal Chemistry would be helpful, perhaps with activities incorporated to meet other Ph.D. students across the college. The Review Team proposes that the COP fund an all-college seminar series that would bring eminent scholars from all areas of pharmaceutical research. Some of these would be from off-campus, but occasional speakers from on-campus could also be interspersed. This would also be a chance to bring in speakers from pharmaceutical and/or biotech industry related to pharmacy. Also, Ph.D. alumni
who have been successful in their careers could also be speakers. Opportunities should be made for graduate students to meet with these speakers. This would be across departments and would provide opportunities for the graduate students to interact with the speaker and with one another as well (perhaps with cross-departmental students to host the speaker for an informal discussion session with the speaker).

**Finding:** Improvements need to be made in tracking the careers of Ph.D. graduates for increased interaction of alumni with current students and faculty.

**Recommendation:** The Review Team felt that there was a need to improve central tracking of Ph.D. graduates for purposes of a), enrichment of the current environment by having graduates come back to campus and interact with current students; and b), development of alumni relationships that could be important for cultivating a climate for the future donations to the graduate program. The Review Team recommends that this should be a joint effort between the Department, the COP administration, and the COP development officer(s).

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**Recommendation:** We recommend exploration of increased flexibility, consistency and fairness in these issues on the part of Departmental faculty to accommodate individual student needs.

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**Finding:** Over several years there has been attrition of faculty positions in the Department of Medicinal Chemistry; these faculty positions have not been reestablished in recent years. Consequently, the Department is short of at least two full-time FTE’s. The acquisition of these two faculty lines would bring Department faculty numbers back to a total of eight.

**Recommendation:** Because of the state budget situation, university and COP budget it is unlikely that the two unfilled faculty lines will be filled in the near future. The Review Team strongly advocates increasing the number of faculty within the Department to eight, but are aware that budgetary and space limitations make this an unlikely prospect at the present time.

**Finding:** There does not appear to be a formal mechanism in place for the mentoring of junior faculty. This is an important process, which can provide junior faculty with valuable advice on how to successfully negotiate the tenure track pathway, and how to make sure that progress is made in developing good grantsmanship skills, good writing skills, and timely publishing habits, as well as maintaining the correct balance between research, teaching and service efforts.
**Recommendation:** The Review Team recommends that the Department Chair appoint senior and mid-career faculty members with the appropriate background to mentor junior faculty whose research expertise is close to their own.

**Finding:** There appears to be a feeling of compartmentalism, and a sense of territorialism and rivalry among the various COP departments that is not conducive to productive professional interactions between COP faculty. This may be a consequence of the geographical separation of the various disciplines, which precludes effective interactions and inhibits research collaboration between faculty, and to the absence of joint departmental research meetings, such as regular all-college seminars, research discussion groups, and journal clubs.

**Recommendation:** One way of improving this situation is to bring departments together by mixing the labs of faculty from different departments within the same area or floor. This physical intermixing of faculty may improve interaction and lead to more joint Departmental research meetings that will foster collaborative ventures and grant applications by faculty.

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**Recommendation:** The technology transfer expertise on the campus is excellent and members of the Technology Transfer Office are very supportive of Department faculty who wish to protect and commercially develop their research findings. In addition, the COP as a whole has a good track record in entrepreneurial activities. The Review Team recommends that efforts be made to inform junior faculty of such opportunities, and that steps be taken to help and encourage those faculty who have a genuine interest in pursuing patent protection of their research data.

4. **Instrumentation and Recommendations.**

**Finding:** While the Review Team found that faculty equipment needs were well met, it was also determined that certain critical research instrumentation was needed. The Department or COP needs to invest in an FT-IR spectrometer (apparently, students must go to Chemistry for an IR spectrum at the present time). Other pieces of instrumentation that are urgently needed are an ultracentrifuge and a scintillation counter. There also needs to be a good plan set up for equipment maintenance (especially high-end instrumentation) to avoid costly out-of-warranty repairs.

**Recommendation:** The COP or the Department (if resources are available) should develop a plan to purchase the three pieces of instrumentation that are urgently needed by the faculty in the Department of Medicinal Chemistry. In addition, the COP should put in place a comprehensive plan to support either partially or wholly, the maintenance costs of heavily used instrumentation with a priority given to those instruments that are utilized across departments.
5. Administrative Issues and Recommendations.

Finding: There was a feeling amongst faculty in the Department of Medicinal Chemistry that there was a lack of recognition by the Health Sciences Center administration of the research achievements of the COP and its faculty, which may have led to difficulties in the COP justifying and maintaining vital research space for faculty growth and development.

Recommendation: The Department and COP administration should make a concerted effort to provide the higher administration of the Health Sciences Center with convincing rationale for why the research space needs of the COP and the Department are vital to the success of the program and to the campus research effort, and why this issue should be given a high priority.

Finding: There was a perception by faculty that the Dean’s office could be little more responsive to the space needs of successful faculty who are growing their research program and who are frustrated with the lack of progress in finding additional laboratory space within the COP.

Recommendation: The Review Team strongly recommends that the Chair, the Associate Dean and the Dean do all that is within their power possible to obtain space for successful Department faculty who are growing their research programs. If this is not done the COP and the Department run the risk of losing these valuable faculty members to other universities where space would be made available.

Finding: The Executive Associate Dean’s office appears to be inadequately staffed to carry out its role in fully supporting the research effort of the COP, the individual Departments, and the faculty.

Recommendation: The Review Team strongly recommends that the Executive Associate Dean take the necessary steps to ensure that a knowledgeable team of support staff who can turn things around quickly, and who will make an effort to expeditiously support faculty research activities, is available to accommodate faculty needs.


Responses from department are in italics after each recommendation

Review of the Graduate Program
Department of Medicinal Chemistry
College of Pharmacy, University of Florida.

Peter A. Crooks, University of Kentucky
William Gerwick, University of California San Diego
Michael Duffel, University of Iowa

March, 2008

STRENGTHS

Faculty:

The graduate program in the Department of Medicinal Chemistry at the College of Pharmacy, University of Florida, Gainesville has a good National reputation. The Department has a mix of faculty at various stages of their academic careers, including promising junior faculty, successful mid-career faculty, and eminent, seasoned faculty with national and international reputations. Some excellent hires of faculty by the Department, both historically and recently, have been made, which has had a very positive impact on the strength of the research programs. As a result, the faculty is universally research active with most having well funded research programs. All faculty are actively involved in the training of graduate students and post-doctoral fellows. The Medicinal Chemistry faculty research funding record is one of the strongest in the COP, and constitutes about one-third of the total extramural research funding for the COP. Several Medicinal Chemistry faculty members serve on NIH study sections, and several are editorial board members of scientific peer-reviewed journals.

Graduate Students:

The Department of Medicinal Chemistry has been able to consistently recruit good quality students into their graduate program, despite the extremely low graduate student stipend level. The COP is very generous in providing support to faculty for graduate student stipends, and up to 2 and 1/2 graduate students per faculty member can be state- or university-funded. In addition, graduate student tuition costs are borne by the COP. Most students either take positions in academia or in the pharmaceutical industry.

Department Infrastructure and Instrumentation:

The Department of Medicinal Chemistry has adequate infrastructure and good instrumental facilities to support their research program, and most faculty members have state-of-the-art instrumentation available for their research work. The campus NMR spectroscopy facilities are particularly impressive and this is a real strength of the University Health Sciences Center facilities.
Graduate Teaching Program:

The Department of Medicinal Chemistry graduate teaching program is generally well structured with a strong core course curriculum. The qualifying exam format is well organized and includes an evaluation of the dissertation research proposal of the student by the Ph.D. advisory committee.

Response: We thank the committee for these positive comments.

WEAKNESSES, CONCERNS AND RECOMMENDATIONS

1. Space Issues and Recommendations

Finding: The External Advisory Review Team received consistent comments from the Department of Medicinal Chemistry Self Review document, the faculty, the Executive Associate Dean of the COP, and the Dean of the COP that lack of space for faculty growth as well as new faculty hires and increases in the number of graduate students is a major problem for the Department of Medicinal Chemistry. Two of these features (faculty growth vs. new faculty hires) operate in different time scales. The first of these involves current faculty with the issues becoming critical within the next 6-12 months; the latter issue will likely develop to significant proportions in the 5-8 year time framework, deriving in large part from the anticipated retirement of 3 senior faculty members within the department. Additionally, although the Department has eight Medicinal Chemistry faculty lines, only six are currently filled. However, the budget situation in the state, university and COP are such that these two unfilled faculty lines are not likely to be filled in the immediate future. While the Review Team strongly advocates for increasing the number of faculty within the Department to eight, the budgetary and space limitations make this a less approachable problem at the present time; alternatively, the short term space issues are of greater urgency and need to be addressed immediately, as described below.

Consistent with the excellent hires of faculty by the department, both historically and recently, the faculty is universally research active with most having well funded research programs. However, the space required to hire and house new research assistants/graduate students is simply not available within the two floors dedicated to the Department. The consequences of not allowing for growth of the new faculty are to put the COP and the university at grave risk of loosing these faculty members to positions at other universities where space would be made available. The negative consequences of these potential faculty losses must be realized and fully appreciated by the Department, the COP and the university administration.
Immediate negative consequences of faculty losses due to shortage of space:

- Loss of the original start-up investment in these faculty
- Loss of time and effort spent in the original recruitment of these faculty
- Loss of grant funds currently held by these faculty, IDC and direct cost monies
- Loss of prestige in the national stage of academic pharmaceutical sciences
- Additional COP expenses required for new faculty recruitment and start-up
- Likelihood of difficulty to attract quality faculty due to damaged reputation
- Erosion in the research momentum currently enjoyed by the Department and the COP
- Loss of key personnel that should be in line to provide critical Departmental and COP leadership in a few years time

Recommendations:

- First and foremost, space that has been taken away from the Department of Medicinal Chemistry and ‘temporarily’ given to the Department of Medicine as swing space must be aggressively pursued by the COP administration for return to the department. This becomes especially critical with recent changes in senior administration within the Health Sciences. We agree with this recommendation.
- At the Departmental level, space allocation between the six current faculty members needs to be reviewed, and potentially adjusted. Currently, the formula for determining space appears to be loosely based on grant dollars, with the quoted formula being $268 to $300 per sq. ft. However, it was the perception of the Review Team that some spaces are under-utilized in terms of number of people per square foot whereas other areas are overcrowded to the point of becoming unsafe. Because laboratory personnel are funded from a variety of sources, including COP faculty lines (e.g. some faculty are laboratory active themselves), Departmental (TAs and other student fellowships), research grant funded personnel, unpaid undergraduate students paid from fellowships or earning academic credits), visiting scientists paid from non-university resources, there should be some integration of formulas, one based on grant dollars per sq. ft. and a second based on number of personnel per sq. ft. Integration of these concepts could lead to some revisions in current space allocations within the Department, and thus relieve some of the overcrowding. We agree with these recommendations.
- It appears that the last meeting of the COP Space Utilization Committee was in 2004; this committee should be charged to meet on an annual or semi-annual basis, with the charge of reviewing and recommending space allocations to departments on the basis of COP goals and needs. We agree – Dean Millard has reconvened this committee.
- The Review Team was told that space utilization is not regularly reviewed by the Executive Associate Dean. This review should occur annually or semi-annually,
as well as on an as-needed basis. This review by the Executive Associate Dean should both identify needs/problems, and suggest solutions that would enhance the research and scholarly environment of the entire COP. *This is not accurate – space utilization is reviewed on a regular basis as well as an as-needed basis.*

- At both the Departmental and COP level, an innovative approach needs to be applied to providing adequate space for current faculty and Ph.D. student growth (and retention). This may take the form of consolidating like facilities between different departments into common space (e.g. storage, freezer farm, duplicated equipment, common room for shared instrumentation) as well as better utilization of space (e.g. change the use of storage rooms for higher priority purposes and then move these ‘storage’ items to spaces elsewhere on or off campus). *These are suggestions that bear consideration, however our storage rooms are not air-conditioned.*

- It was the perception of the Review Team that a substantial amount of old, unused, and possibly non-functional instruments as well as old boxes, experimental apparatus and chemicals take up an unnecessary amount of space. A good cleaning out of these items could substantially increase the available work space. *We are not sure what items are specifically referred to here – none of the faculty had non-functional instruments or apparatus in their labs.*

- A lunch room or lunch room-like space (e.g. wide portions of hallways outfitted with couch/low table) needs to be created that is attractive and functional so that students can eat and/or drink there, and not in the laboratories. OSHA regulations prohibit eating and drinking in laboratory space, and hefty fines are levied on violators. *This is a nice idea, however it is against the rules of the fire marshal to have couches or tables in the hallway.*

### 2. Graduate Student Issues and Recommendations

**Finding:** The Department of Medicinal Chemistry has a history of recruiting high quality students for admission to the Ph.D. program in Medicinal Chemistry despite the extremely low graduate student stipend level.

**Recommendation:** These high standards for admission should be maintained, while taking additional steps to improve the percentage of students who enroll from the pool of students who are accepted into the program. This currently stands at just over 33%, and has been mainly attributed to the very low graduate stipends offered to prospective graduate students. *We agree.*

**Finding:** The Department, College and Graduate School would like to significantly increase the number of graduate students in Medicinal Chemistry. This will require enhanced stipends, increased faculty numbers, increased availability of high quality research space, and improved recruitment strategies.
**Recommendation:** Recommendations regarding research space are elsewhere in this document. The Review Team recommends that the extent of current extramural funding success and potential for taking advantage of interdisciplinary opportunities on campus warrant the addition of two new faculty lines in the department. The Review Team also identified three potential sources of funding (i.e., COP, Graduate School, and NIH training grant) that should all be pursued for enhancement of stipend levels, and details are included below in a separate recommendation. In recruiting activities, it was recommended that the Department be encouraged to examine its website design to make it more informative to students. The website needs to be improved in content and attractiveness, and needs to provide additional information in areas such as graduate curriculum and progression through the program, current graduate students, and where Ph.D. alumni of the Department are now. This is of critical importance, since it appears to be the COP’s major tool for graduate student recruitment. *We agree and request that the Dean identify a web designer to improve our webpage.*

**Finding:** Graduate student stipends are very low in relation to national benchmarks and local living expenses and the dollar amount is not competitive at the National level.

**Recommendation:** The graduate student stipends should be adjusted to be comparable to National benchmark levels. The Department should examine various mechanisms for the enhancement of stipends: 1) additional TA funds from the COP to enhance graduate recruitment; 2) use of Graduate School Alumni Scholarship funds to enhance multiple stipends in recruiting (e.g., if a single Alumni Scholarship of 20,000 were split into four supplemental fellowships of 5,000 each, this would bring four first year stipends to $22,500). Dean Frierson has recently changed Graduate School policies to enable splitting this fellowship into several supplemental fellowships to enhance stipends; 3) the Department is encouraged to explore initiating an NIH training grant application (perhaps in an area such as drug discovery) with involvement of an additional 10-12 NIH-funded PI’s from other departments (both within and outside the COP). The Graduate School will provide a commitment of one student for every 2 students on such a training grant to facilitate this. *These are excellent suggestions, which we will pursue.*

**Finding:** There is a need for research career development opportunities for graduate students.

**Recommendation:** A team-taught research career development course at the collegiate level could take advantage of faculty expertise in the COP and elsewhere on campus to address topics such as resume writing, scientific publishing, grant writing, time management, interview skills, scientific meetings/networking, patents and intellectual property, and others. *Such a course is available through the college of medicine.*

**Finding:** Funds for graduate students to attend scientific meetings are not generally available.

**Recommendations:** The Review Team recommends that some full or partial travel scholarships be made available to graduate students who are presenting their research findings as either a podium presentation or a poster presentation at a National research meeting. These funds should be made available either by the COP or the Graduate
School, or both. There are already funds available for this purpose from the COP and the VP for Research.

**Finding:** Graduate students in Medicinal Chemistry feel somewhat isolated within the COP. Moreover, they do not appear to be optimally exposed to seminars from National and International leaders in the field.

**Recommendation:** An orientation session for incoming graduate students in Medicinal Chemistry would be helpful, perhaps with activities incorporated to meet other Ph.D. students across the college. The Review Team proposes that the COP fund an all-college seminar series that would bring eminent scholars from all areas of pharmaceutical research. Some of these would be from off-campus, but occasional speakers from on-campus could also be interspersed. This would also be a chance to bring in speakers from pharmaceutical and/or biotech industry related to pharmacy. Also, Ph.D. alumni who have been successful in their careers could also be speakers. Opportunities should be made for graduate students to meet with these speakers. This would be across departments and would provide opportunities for the graduate students to interact with the speaker and with one another as well (perhaps with cross-departmental students to host the speaker for an informal discussion session with the speaker). *We agree.*

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