Strategic Plan

Department of Biochemistry and Molecular Biology

Mission

The Department of Biochemistry and Molecular Biology builds and disseminates understanding of the molecular basis of life.

Vision

The Department of Biochemistry and Molecular Biology will increase knowledge, advance our understanding of the basic mechanisms of life, and ultimately improve the human condition and quality of life through:

- outstanding educational programs that produce graduates of world-class caliber.
- recognized, vigorous research programs that make important discoveries.
- service as a recognized resource for cutting-edge knowledge, practical expertise, and modern research infrastructure.

Core Values

- Diversity – We respect others and value diversity of opinions, freedom of expression, and other ethnic and cultural backgrounds.
- Integrity – We are committed to the principles of truth and honesty and we will be equitable, ethical, and professional.
- Service – We believe that serving others is a noble and worthy endeavor.
- Intellectual Freedom – We believe in ethical and scholarly questioning in an environment that respects the rights of all to freely pursue knowledge.
- Excellence – We seek excellence in all our endeavors, and we are committed to continuous improvement.
- Stewardship of Resources – We are dedicated to the efficient and effective use of resources, accept the responsibility of the public's trust, and are accountable for our actions.

Goals, Critical Success Factors, Objectives, and Strategies

Goal 1: Student Development - Recruit, retain, and graduate high-quality, diverse students.

Critical Success Factors for Goal 1:

- Undergraduate and graduate student population with diversity that equals or exceeds that of the OSU student body as a whole.
- Less than 2 students per major piece of laboratory equipment and sufficient reagents in Biochemistry laboratory courses.*
- 100% participation of undergraduate majors in a meaningful laboratory research experience.

- Faculty to student ratio of more than 1:40 in Freshman Research Scholars program.*
- Stipend level for Research Assistants and Teaching Assistants of at least the median of the stipends of other Big12 Biochemistry Departments.*
- All graduate students have at least one "hands-on" course in cutting-edge technologies and methods.*
- Graduate student applications acknowledged within three weeks of their applying to OSU.*
- Average of 2 undergraduate students per year as Wentz Scholars or Fellows, Niblack Fellows, or holders of similar awards.
- Faculty salaries that are at least at the median of the comparable-department average in the Big12.*

Objectives for Goal 1:

Objective 1.1: Develop an effective program to recruit, retain, and graduate high quality, diverse graduate students.

Strategies:

- Work with DASNR and University administration to increase the number of tenure-track faculty to at least sixteen.*
- Action by the State Legislature and OSU administration to increase faculty salaries to the median of the comparable-department average in the Big 12.*
- Work with DASNR and University to obtain three new graduate student teaching assistantships.*
- Obtain a tenure-track faculty member whose duties include significant efforts towards graduate student recruitment.*
- Obtain additional support personnel to aid in paperwork and other aspects of graduate student recruitment. *
- Work with DASNR and University to obtain additional resources for increasing to sufficient levels personnel skilled in using the high technology, multi-user equipment available in the OSU "nucleic acid and protein core" facility.*
- Work with DASNR and University administration to obtain sufficient financial support to obtain and maintain high-technology equipment in the OSU "core" facility as a shared University resource.*
- Work with OSU foundation to obtain donor funds to endow fellowships for graduate students.*
- Increase the number of Graduate Student applications for University, State, and National Fellowships and Scholarships.
- OSU library must maintain and increase access to primary scientific journal subscriptions, particularly those with on-line access.*
- Provide easily accessible, state-of-the art computers for writing and research, including access to the WEB.
- Get the Graduate School to send a student's application material or a copy thereof (whether completed or not) to the department within two weeks of receipt at the Graduate School office.*
- Build and maintain an attractive, user-friendly, and up-to-date WEB page for the department, which clearly presents our mission, our faculty, and our research and teaching programs.

- Obtain financial support from DASNR and University administration to aid in the Departmental support of the activities of the Biochemistry and Molecular Biology Graduate Student Association.*

Objective 1.2: Develop an effective program to recruit, retain, and graduate high-quality, diverse undergraduate students.

Strategies:

- Work with DASNR and University administration to increase the number of tenure-track faculty to at least sixteen.*
- Work with DASNR and University administration to have sufficient faculty so the student to faculty ratio is 15:1.*
- Action by the State Legislature and OSU administration to increase faculty salaries to the median of the comparable-department average in the Big 12.*
- Apply for external funding to attract and mentor minority students.
- Obtain financial support from DASNR and the University to combine with departmental or extramural funds for the purchase of additional equipment for the teaching laboratory.*
- Obtain a tenure-track faculty member whose duties include significant efforts towards undergraduate student recruiting and advising.*
- Work with OSU foundation to obtain donor funds to endow scholarships for undergraduate students.*
- Provide easily accessible, state-of-the art computers for writing, research, and work on the WEB.
- In collaboration with DASNR and University, continue to encourage and aid undergraduate student applications for University, State, and National Fellowships and Scholarships.
- Build and maintain an attractive, user-friendly, and up-to-date WEB page for the department that clearly presents our mission, our faculty, and our research and teaching programs.

Goal 2: Academic Excellence - Provide excellent and effective educational programs.

Critical Success Factors for Goal 2:

- 90% of courses undergo peer assessment for excellence every third year for continuously taught courses and every third time the course is taught for courses in a two-year rotation.
- 90% of majors who complete the undergraduate biochemistry and molecular biology degree program complete or surpass the recommended American Society for Biochemistry and Molecular Biology undergraduate curriculum.
- >90% of undergraduate majors in the department of Biochemistry and Molecular Biology show retention of basic knowledge assessment scores after the required curriculum.
- 100% of undergraduate majors in the department of Biochemistry and Molecular Biology increase their knowledge and skill assessment scores. 90% will answer > 50% of the questions correctly after the required curriculum.

- 75% of undergraduate majors who complete their application to medical school, graduate school in the biological sciences, pharmacy school, veterinary school and other health professional schools are accepted.
- 60% of undergraduate majors who seek employment as biotechnology professionals successfully gain employment within a year of graduation.
- 100% participation in a meaningful research laboratory experience.
- >3.0 average score in student satisfaction on Student Survey of Instruction.
- < 2 students/major piece of laboratory equipment and sufficient reagents in Biochemistry lab classes.
- > $1,000,000/ year in graduate and undergraduate programs through extramural funds.
- >1 first author paper accepted in a peer-reviewed journal for every PhD candidate.
- >1 national professional meeting presentation for every PhD candidate.
- 90% of MS and PhD graduate students move into related professional positions within a year of their degree.
- Critical mass of >35 graduate students is maintained.
- A ratio of 1:15 for teaching faculty FTE: undergraduate + graduate students.* *
- Number of University-funded teaching assistantships increased to 3.
    - 100% of teaching faculty attend at least 1 faculty development event/year.

Objectives for Goal 2:

Objective 2.1: Develop, administer, and act upon up-to-date assessment instruments that accurately assess what we teach our undergraduate majors.

Strategies:

- Develop a 50 question basic knowledge test by compiling 5 questions from each of 10 faculty members. Questions will reflect knowledge that should be entrenched by beginning of 3rd year.
- Develop a 50 question biochemistry and molecular biology knowledge and skill test by compiling 5 questions from each of 10 faculty members. Questions will reflect knowledge that should be learned by end of 4th year.
- Administer both tests to every major at beginning of 3rd year and immediately prior to graduation.
- Use test results to identify areas of deficiency and adjust curriculum accordingly.

Objective 2.2: Maintain high quality undergraduate and graduate advising to best develop students into knowledgeable, well-trained, ethical, and healthy citizens.

Strategies:

- Recruit enthusiastic new teaching faculty with responsibility to recruit and advise DASNR biochemistry and molecular biology majors.*
- Engage in frequent and active discussions with students to best tailor program to each student's talents and interests.
- Update information on the content of courses Biochemistry and Molecular Biology students take.
- Update and polish advising skills by attending University-sponsored development activities.

- Facilitate undergraduate student development through fostering internships on and off campus.
- Advisors and faculty will have periodic meetings to discuss curriculum and job market opportunities for Biochemistry and Molecular Biology graduates.*
- Have additional office staff to orchestrate pre- and post-graduation assessments.

Objective 2.3: Increase faculty:student ratio while increasing the excellence of instruction and maintaining a diverse faculty.

Strategies:

- Recruit enthusiastic new faculty for undergraduate and graduate teaching while maintaining our rich multicultural diversity.*
- Institute evaluation of least 5 lectures/course being evaluated. Instructor and evaluator will discuss points of focus before the evaluation. A written evaluation and meeting between the instructor and evaluator will complete the process.
- Sharpen teaching skills through participation in faculty development events.

Objective 2.4: Revise and continually update the undergraduate and graduate curricula in the biochemistry and molecular biology of human, animal, and plant health to improve the acquisition, retention, and integration of knowledge, as well as critical thinking skills.

Strategies:

- Peer review all courses by instituting a rotation of evaluators to attend at least 5 lectures/course being evaluated. Instructor and evaluator will discuss points of focus before the evaluation. A written evaluation and meeting between the instructor and evaluator will complete the process.
- Hold meetings of undergraduate and graduate teaching faculty to plan and implement new curricula.

Objective 2.5: Provide meaningful, up-to-date, laboratory experiences to educate students in biochemical and molecular biological research.

Strategies:

- Guide undergraduate students to research experiences in individual laboratories as suits their particular interests.
- Obtain financial support from DASNR and the University to aid in the purchase of additional equipment for the teaching laboratory.*
- Have graduate students begin rotations immediately upon entering the department to provide more than one laboratory experience before the student enters a laboratory for thesis research.
- Continue to update formal laboratory courses to reflect current research.
- Faculty groups and individuals will continue to leverage extramural funds providing for high-quality research programs.

Objective 2.6: Increase the participation of graduate students in communicating the results of scientific research to the scientific community and the general public.

Strategies:

- Require graduate students to write research results for submission to peer-reviewed professional journals.
- Encourage graduate students to attend at least one national meeting and present research results in the form of poster or oral presentations.
- Encourage departmental graduate student group meetings in which students share results with each other with some departmental support for refreshments.
- Arrange for graduate students to attend seminars and lunchtime meetings with seminar speakers.

Goal 3: Academic Excellence in Research - Maintain and build recognized interactive, multi-disciplinary research programs.

Critical Success Factors for Goal 3:

Development of the Department's research programs.*

- Tenure-track research faculty staffing level of 16.
- Average of $100,000 per faculty member in extramural funding.
- Publication of 2 peer-reviewed primary papers on average per faculty member per year.
- Maintenance of current levels of research personnel supported by intra- and extramural funding, including post-doctoral associates, research assistants and technicians.
- Participation of each member of the department's staff and faculty in at least one appropriate professional development activity per year.
- Submission of research proposals on an average of 2 per faculty member.
- An increase in the number of research personnel supported by extramural funding, including post-doctoral associates, research assistants and technicians, in proportion to the number of new faculty recruited.
- Maintenance and modernization of core information technologies that are recognized to be critical for our research efforts as evidenced by: computers utilized by faculty, students and staff being no older than 5 years; an adequate number of computers available so there is no lag between required access and use of a computer; all critical software required for research efforts supported by site licenses; all computers connected to the internet; adequate computing power available to support computational-intensive research efforts; and adequate server space available to store research data and back-up all critical files.*
- Recognition of the department's research programs as reflected in:
- The number of special research awards recognizing the department's research personnel.
- The number of faculty serving in leadership roles in national organizations.
- The number of faculty serving on editorial boards of peer-reviewed journals.
- The number of journal articles that faculty are requested to review for peer-reviewed journals.
- The number of faculty serving as ad hoc or permanent members of national funding agency review boards (e.g., study sections), or requested to review grants for funding agencies.
- The number of faculty invited to give seminars, or speak at national and international meetings.

- The number of featured articles publicizing impact of departmental research on a scientific field, or other areas that impact the quality of life and economic development.
- The number of patents and trademarks obtained.
- The number of faculty serving as consultants.
- An increase in our program ranking based on research publications and amount of extramural funding.

[Note that these are quantifiable items that are inherently unpredictable in their nature, as such no firm numbers can be placed on each category. However, an increase in these numbers with time will be indicative that our research program is growing and becoming increasingly successful.]

Development of interactive, multi-disciplinary, collaborative research programs, as evidenced by:

- The percent increase in the number of multi-authored peer-reviewed publications containing multiple members from the department's faculty, members from other OSU departments, or members from other universities, institutes or companies.
- The percent increase in the number of grant proposals submitted that contain multiple members from the department's faculty, members from other OSU departments, or members from other universities, institutes or companies.

Objective 3.1: Return the current department to a critical mass of 16 tenure-track research faculty, while developing effective strategies to: retain current faculty; enhance faculty competitiveness for extramural funding; foster the development of our departmental staff; and augment the research abilities of our undergraduate and graduate students.

Strategies:

- Recruit four new tenure-track research faculty members.*
- Submit, on average, two proposals for extramural funding per faculty member per year, dependent upon past success and current funding levels.
- Hire 3 new office staff members so that financial administration of extramural funds can be carried out in a timely manner.*
- Bring faculty, staff and research personnel salaries into parity with the average of other Big 12 institutions.*
- Increase the level of available research space to retain an appropriate stimulating research environment for newly recruited faculty members.*
- Encourage and support all departmental staff and faculty in participating in appropriate professional development activities.
- Encourage and support faculty requests for sabbatical or mini-sabbatical leaves that will expand faculty member research expertise and maintain their competitiveness for extramural funding.*
- Target use of department's IDC and station maintenance funds to start-up of new faculty members research programs and to maintain programs of other faculty during times of lapses in funding.*
- Encourage the administration to continue TRIP programs to seed preliminary research of faculty members that will make them competitive for extramural funding.*
- Submit additional grant proposals to maintain current educational programs for stimulating undergraduate research opportunities.

- Submit training grant proposals to expand and enhance the quality of our graduate research program.
- Encourage administrative support of the OSU DNA/Protein core facility to maintain and expand its ability to present high quality workshops on state-of-the art research techniques.*
- Lobby administration to direct the OSU Development Foundation to pursue donations to fund start-up and seed programs for faculty research, and to provide matching funds for the purchase of major pieces of instrumentation.

Objective 3.2: Develop recognized interactive, multi-disciplinary research groups through expansion of the department's faculty research base and areas of expertise in a manner that fosters collaborative interactions and the synergistic use of resources.

Strategies:

- Recruit new faculty who will expand the department's research expertise.*
- Recruit new faculty whose research interests, in part, complement those of other departmental members, and may foster development of collaborations within and outside the department.*
- Encourage the administration to continue the TRIP program to seed collaborative research efforts among faculty members that will lead to submission of multidisciplinary grants proposals for extramural funding.*
- Solicit the administration to support, at an appropriate level, the purchase and maintenance of critical state-of the art multi-user research instrumentation that will build a research infrastructure that encourages the central use of core resources in instrumentation.*
- Solicit the administration to support the purchase and maintenance of information technology infrastructure (i.e., file servers, networking, and shared applications).*
- Develop a multi-disciplinary research seminar program to foster interactions between faculty members from different departments and collaborations between faculty members.
- Encourage the submission of collaborative grant proposals, and recognize the contributions of the position of Co-Investigator relative to tenure and promotion.
- Continue the department's tradition of sharing research instrumentation and encourage the submission of proposals for the purchase of multi-user instrumentation.

Objective 3.3: Develop strategies for promotion of public awareness relating to the academic excellence of the department and how research findings published through efforts of departmental personnel contribute to health, public welfare and economic development within the state and the nation.

Strategies:

- Designate a faculty member or committee whose responsibility will be to promulgate information on research accomplishments of the faculty and how they contribute to the betterment of the health, public welfare, and economic development of the state.
- Develop a closer relationship with the DASNR's public relations department, to take advantage of their ability to facilitate the publication of articles that inform the state's population of how the department's research accomplishments contribute to the betterment of health, public welfare, and economic development of the state.

Objective 3.4: Build upon the diversity within the department by recruiting new tenure-track research faculty and promoting diversity within our undergraduate and graduate student populations.

Strategies:

- Recruit new faculty who will expand the department's diversity.*
- Recruit graduate students with diverse backgrounds.
- Maintain and expand current educational programs that promote student diversity in undergraduate research and submit proposals to funding agencies to assist efforts for the recruitment and support of graduate students from diverse backgrounds.

Goal 4: Leverage Resources in Oklahoma - Share our outstanding infrastructure and provide specialized training in molecular biotechnologies.

Critical Success Factors for Goal 4:

An average increase of 5% per year in the impact of the System's multi-user molecular biotechnology Facilities, as demonstrated by:*

- extramural grants awarded to clients
- grant applications by clients
- publications by clients
- new Facility clients
- new services

An average of 20 wide-spread outreach efforts per year to publicize the System's cutting edge molecular biotechnologies:*

- guest lectures and presentations to diverse student bodies
- hands-on workshops for students, faculty, and staff
- presentations to the general public
- seminars presented to various departments
- newsletters
- websites
- vendor fairs

Universal state-wide availability of the multi-user Facilities' current infrastructure:*

- DNA sequencing
- Protein sequencing
- Mass spectrometry and proteomics
- Bio-robotic solution handling
- Bio-reagent vending
- Microarray printing, scanning, and interpretation
- Bioinformatics

Regular assessment, evolution, and procurement of cutting-edge technologies:*

- X-ray diffractometry and protein crystallography

- Proteomics tandem mass spectrometry of peptides and other molecules
- Genetic analysis
- Real-time polymerase chain reaction (RT-PCR)
- Videoconferencing

Expert staffing to support the System's multi-user molecular biotechnology infrastructure:*

- DNA/Protein Facility-one Ph.D. and three technicians
- Microarray Facility-one Ph.D. and one technician
- Bioinformatics Facility-one Ph.D. and two technicians
- X-ray Crystallography Facility-one Ph.D. and one technician
- Electronics Repair Shop-one technician

A critical mass of molecular biotechnology consultants within the System:*

- Positions whose formal job descriptions include providing consultation to the System's research community
- More than 100 years of cumulative intellectual capital among these consultants

Effective stewardship of this multi-user infrastructure, as demonstrated by:*

- Universal statewide access to these resources
- Regular assessment of Facilities' performances
- Use fees that are equal to, or less than, the Big 12 median
- Use fees that are compliant with cost-accounting guidelines
- Debt-free accounts
- Monthly invoicing

Objectives for Goal 4:

Objective 4.1: Improve the economy and the quality of life in Oklahoma by providing universal access to the cutting-edge research infrastructure and services necessary to attract and retain top-notch faculty with world-class research programs in the molecular life sciences.

Strategies:

- Procure and maintain an inventory of high-capital equipment essential for cutting-edge molecular biotechnologies.*
- Use this equipment to offer specialized analytical services performed by well-trained research specialists.*
- Wherever feasible, offer direct ("hands-on") access to this equipment.
- Periodically review the quality and impact of the Facility's technological offerings.*
- Maintain a local cost-effective Electronics Shop for timely repair of electronic instrumentation.

Objective 4.2: Enhance the excellence of the OSU System's education, research, and extension programs by teaching undergraduates, graduate students, staff and faculty to use these cutting-edge technologies.

Strategies:

- Continue and expand "hands-on" workshops on advanced molecular biotechnologies:*
  Recombinant DNA Techniques Microarray Analysis
  Proteomics and Mass Spectrometry Bioinformatics

Protein Crystallography High-throughput Genotyping
Gene Expression Quantification via Real-time Polymerase Chain Reaction

- Extend these technologies to the classroom and to undergraduate research experiences.
- Give presentations to diverse groups of students and researchers to promote understanding of molecular biotechnologies.

Objective 4.3: Increase synergy and leverage resources by ensuring universal multi-user access to this essential capital-intensive research infrastructure.

Strategies:

- Provide universal access and pricing regardless of unit affiliations.
- Where applicable, operate as a sound University "Store," and remain compliant with relevant policies.
- Obtain System-level support for staffing and instrument maintenance of these multiuser facilities.*
- Foster partnerships with OSU research faculty such that support of these multi-user facilities appears as line items on their major grant applications.
- Develop infrastructure by leveraging state dollars as matching funds for federal-level infrastructure proposals from faculty groups.*

Objective 4.4: Enhance the image of the OSU System and develop partnerships/collaborations by communicating and marketing the excellence of OSU's molecular biotechnology research infrastructure.

Strategies:

- Solicit and participate in fundraising efforts orchestrated by the OSU Foundation.*
- Promote the System's capabilities in molecular biotechnologies to the general public and to Oklahoma's biotechnology industries.*
- Serve Oklahoma's biotechnology industries by providing them with access to the System's cutting edge capabilities.

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*These critical success factors and strategies will require DASNR or other OSU administrative units to commit resources in addition to current allocations.