All graduate students majoring in Entomology are required to complete ENT 502 Insect Systematics and ENT 503 Insect Morphology and Physiology as part of the requirements for M.S. and Ph.D. degrees. However, if the incoming student is able to pass a proficiency examination for either or both of the courses, then the requirement for either or both of the courses will be fulfilled and the course need not be taken.

The preparation and administration of the proficiency examination is the responsibility of the instructors. At the present time, this is Dr. Deans for ENT 502 and Dr. Roe for ENT 503. The proficiency examination will be given at least once a year, the ENT 502 exam shortly before the beginning of the fall semester and the ENT 503 exam shortly before the beginning of the spring semester. Other exam times can be arrange with the instructors if sufficient justification exists, but student should take the exam at their earliest opportunity after arrival on campus. A student will be allowed to take each proficiency exam only one time.

Students joining the department who believe they have the background course to pass one or both of the proficiency exams should come to campus prepared to take the exams before the semester begins (ENT 502 is given in the fall and ENT 503 in the spring). A few sample questions from each exam are given for your information.
Sample Questions: ENT 503 Proficiency Exam

1. You need to make-up a $^3$H-radioactive enzyme-substrate solution that has a final substrate concentration of $5 \times 10^{-4}$ M and a specific activity of 8,000 counts per minute (CPM). The efficiency for counting tritium on the liquid scintillation counter is 40%. You have two stock solutions to work with (1) 0.05 mCi, 0.0012 mg of $^3$H-substrate in 0.5 ml and (2) 5mg/ml of cold substrate. The molecular weight of the substrate is 266.4. How much of solution (1) and (2) are needed to make up 1 ml of the enzyme-substrate solution? The density of the solvent being used is 0.791 gm/cm$^3$ at 20°C and 1 curie is $3.7 \times 10^{10}$ disintegrations per second?

2. Circadian rhythm (Circle the letter corresponding to the most correct answer).
   - A. endogenous
   - B. origin of ovipositor
   - C. tritocerebral cross reaction
   - D. action potential propagation
   - E. sperm capacitation

3. Match the letter(s) on the left with each physiological condition on the right. Letters can be used more than once.

   - A. arrested growth
   - B. arrested development
   - C. initiated by adverse conditions
   - D. initiated in anticipation of adverse conditions
   - E. duration exactly equals duration of adverse conditions
   - F. under direct hormonal control
   - G. for a given species, occurs only at a specific stage of development

   quiescence
   ( ) oligopause
   ( ) diapause
4. Identify

_____ frontal ganglion
_____ pre-oral cavity
_____ cibarium
_____ hypopharynx
_____ subesophageal ganglion

5. Action potential depolarization and repolarization is achieved by the passive diffusion of Na\(^+\) and K\(^+\). Explain.

6. Identify the four proteins essential to muscle contraction:
   A. __________________ ____________________________
   B. __________________ ____________________________
   C. __________________ ____________________________
   D. __________________ ____________________________