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A STUDY OF THE CURRICULUM OF THE NATURAL SCIENCE DIVISION
OF OUACHITA BAPTIST UNIVERSITY

A Paper
Presented to
Dr. Joe Nix
Director of the Honors Program
of Ouachita Baptist University

In Partial Fulfillment
of the Requirements for the
Honors Seminar

by
Participants of the
Natural Science Division
May 1968

A STUDY OF THE CURRICULUM OF THE NATURAL SCIENCE DIVISION
OF QUACHITA BAPTIST UNIVERSITY

In our evaluation of the curriculum of the Natural Science Division, we began by reviewing the catalogue descriptions of our courses and evaluating whether the courses meet the objectives given. To do this we divided into departments since our division is so large. Next, we wrote to Hendrix, Little Rock University, Southwestern at Memphis, and State College of Arkansas and compared their course offerings with ours. In this comparison we discovered our strengths and weaknesses and changes that need to be made in our present curriculum. In several cases we decided upon possible alterations which would aid the student going on to graduate school.

During the course of our study, we took into consideration the facilities available, the faculty, the relative importance of each course, and the probable future needs of students. Because of the holding factor of economic considerations, we realize that some of our suggestions may be unrealistic, or at least improbable for the near future. We feel, however, that even without these suggested alterations* Ouachita has a commendable Natural Science Division.

*The individual departmental reports are attached.

Biology Department

Those of us in the Biology Section of the Honors Program, after comparing the catalogue of Ouachita Baptist University with those of the colleges and universities studied, have reached several conclusions: Ouachita's basic Biology courses are relatively good, as compared to other Arkansas colleges. By "basic" is meant freshman Zoology and Botany. We recommend, however, that additional botany courses be offered. We feel that Human Physiology and Anatomy is good as it is carried out now. Histology, which is now a four hour course, should carry with it a two hour course in Histological Technique. This would eliminate the students' learning of slide-making techniques entirely on his own time. Embryology should be almost entirely devoted to lab, with any lectures given during the laboratory period; we now have two hours of lecture plus four hours of lab per week. This would give six hours of lab, which is much needed. Our final opinion was that an additional course in microbiology should be offered, to better learn the application of methods taught in the basic course.

Chris Abernathy
David Claybrook
Nancy Goodson
Mike Grisham
Jim Phelan

Mathematics Department

We feel that the curriculum of the Mathematics Department needs to be expanded. Some suggested courses are: 1) Logic, 2) Probability and Mathematical Statistics, and 3) Complex Variables. A goal for the future is to have a course in computer programming, in order to keep in pace with the trends in modern science. To be able to offer these courses it would be necessary to increase the faculty, and at this time we realize this not possible. Only one member of the faculty in the department holds a doctorate; in comparison with the other departments in the Natural Science Division, this is below par. We feel that several of the higher math courses should be required: Modern Higher Mathematics and Linear Algebra; these are two courses which prepare the student for graduate school and give an insight into new areas of mathematics. Too many of the existing higher math courses are offered in the spring, and this makes it difficult for the practice teacher to work in these courses.

Janie Ferguson
Lana LeGrand
Mary Beth McGee
Janet Moffett
Gail Ray

Physics Department

The main course needed in the physics department is thermodynamics. This is required by most graduate schools and is taught at all four of the colleges studied. A second course which would be useful is one on modern physics. This course is offered at two of the schools studied and is required by some graduate schools. It would be difficult to add these two courses without enlarging the faculty, however.

An alternate proposal is to cooperate with Henderson State College, since the physics departments at both schools are small. Each college would teach only certain of the junior and senior courses. Subjects not offered at one college would be taken at the other. This would enable more different courses to be taught without increasing the costs of either school.

Jimmy McCarty

Preface

It is the purpose of this report to present a comparison of the Chemistry program offered at Ouachita with the curriculum at Southwestern of Memphis, Little Rock University, State College of Arkansas, and Rice University.

Utilizing this information, suggestions are offered for courses which might strengthen the Ouachita curriculum.

A concluding statement is inserted to summarize the findings and opinions of this committee.

"General Chemistry" 104
and
"General Chemistry and Qualitative Analysis" 114

State College of Arkansas offers 8 hours of general chemistry for the college freshman. This is in addition to a Qualitative Chemistry course. The full 8 hours are required for a B. S. degree. Two units of high school algebra and high school chemistry are required. These courses are a survey of the field of chemistry with emphasis on theoretical and quantitative aspects of the science.

SCA also offers a course in qualitative analysis which is not required for a B. S. degree.

Rice University offers 8 hours of "Introductory and Analytical Chemistry" which are comparable to Ouachita's freshman offerings. The second semester freshman course includes qualitative analysis.

Southwestern University offers two courses in general chemistry, in addition to a qualitative analysis course.

Little Rock University's general chemistry offerings appear to be very similar to Ouachita's.

"General and Organic Chemistry" 124
and
"General and Biological Chemistry" 134

Little Rock University and Southwestern University offer two 4 hour courses in elementary chemistry for the non-science major, or someone with no previous chemistry training.

State College of Arkansas offers "Essentials of Chemistry" for students with no chemistry background.

Rice University has no course comparable to these.

"Quantitative Analysis" 204

The quantitative analysis courses offered by SCA and Southwestern are identical to Ouachita's. LRU has a 5 hour course in quantitative analysis, while Rice does not teach such a course.

"Organic Chemistry" 305 a,b

SCA has a course in "Introductory Organic Chemistry" which does not count toward a major. This is a study of the compounds of carbon, stressing nomenclature, synthesis, and reactions.

Eight hours of organic chemistry are offered in addition. The first four hours stress the study of aliphatic compounds, the second four stress aromatic compounds.

Southwestern lists two courses in introductory organic chemistry.

Organic chemistry at Rice and LRU consist of two four-hour courses each semester of the sophomore year--one section for chemistry majors, and one for pre-med students.

"Physical Chemistry" 314 a, b

Physical chemistry at SCA, LRU, Southwestern and Rice is essentially the same as that offered by Ouachita. All the above schools require one year of physics and two years of Calculus except SCA, whose requirements are less stringent than OBU's. We require Quantitative Analysis either as a prerequisite or corequisite, second year Calculus, and a year of elementary Physics, while SCA requires only a year of general chemistry, Calculus IIII, and a year of Physics.

"Advanced Quantitative Analysis" 323

"Advanced Analytical Chemistry" at LRU is a five hour course, with emphasis on instrumental methods.

The advanced quantitative analysis at SCA and Southwestern is similar to OBU's.

Rice does not offer an advance quantitative analysis course as such. However an instrumental analysis course is taught, which will be mentioned in a later section.

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"Advanced Inorganic Chemistry" 323

The "Advanced Inorganic Chemistry" course at SCA is evidently taught on a more elementary level than the comparable course at OBU. Our prerequisite is a year of Physical Chemistry, while SCA requires only freshman Chemistry and College Algebra.

Rice University offers no course in "Advanced Inorganic Chemistry" as such. However, a 3-hour senior course is offered entitled "Special Topics in ^{IN-}Organic Chemistry." The prerequisite is Physical Chemistry.

The prerequisites for advanced inorganic at LRU are General Chemistry and Quantitative Analysis. It is a three hour course.

Southwestern's course appears to be similar to OBU's.

"Organic Preparations" 403

LRU has a senior-level, 2-hour course in Organic Preparations.

SCA, Southwestern, and Rice have no such course. Although, Rice does offer a course on the chemistry of natural products.

"Qualitative Organic Analysis" 413

LRU offers a 4-hour course in Organic Qualitative ^{ANALYSIS}. This course is similar to OBU's. The prerequisite for Organic Qualitative at SCA is a year of general Organic Chemistry, while Ouachita requires Quantitative Analysis in addition.

Rice and Southwestern offer no course, as such.

"Biochemistry" 423

Rice has a 3 hour senior course in Biochemistry with emphasis on the organic aspects of the field.

The Biochemistry at LRU is a 4-hour course.

The Biochemistry course at SCA seems to be more organically oriented than that of OBU, since their prerequisite is Organic Chemistry, while ours is Physical Chemistry. This would indicate that OBU's course is possibly more advanced, and emphasizes the Physical Chemistry aspects of Biochemistry.

A course in Biochemistry is also offered at Southwestern.

"Physical Chemistry" 454

Neither LRU, Rice, or Southwestern offer a course comparable to OBU's "Physical Chemistry" 454. Although Southwestern does have a freshman-level course entitled "Elementary Analytical and Physical Chemistry."

"Radiochemistry" 463

No comparable course is offered at any of the schools studied.

"Special Studies in Chemistry" 491-493

Similar courses are offered at Rice, LRU, and SCA, but not at Southwestern.

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"Courses Not Offered at Ouachita Which Might Prove Useful"

1) A two-hour, sophomore-level course in "Chemical Calculations" is offered by LRU and SCA. This course might prove valuable to the student who experienced difficulty with General Chemistry problems, and who is not qualified to attempt the more advanced calculations of Quantitative Analysis and Physical Chemistry.

2) A course is taught at SCA entitled "History of Chemistry." This course is described as being "designed to give the student of chemistry a better understanding and appreciation of the subject, beginning with the earliest concept of an element in the early Greek period." The prerequisite is 8 hours of chemistry.

This course, while possibly not being immediately applicable to practical, modern chemical problems, or analysis, would probably prove to be useful in that it could show how present theories were evolved, by the scientific procedure. It could be invaluable in teaching the guidelines of the scientific method, and how deductive reasoning was applied to disprove, or lend support to a theory. This could be a very interesting and informative class, and might be offered as a special studies project, or be taught "on demand."

3) SCA also offers instruction in the use of chemical literature in a two hour course. This course is "an introduction to the use of abstracts, journals, and reference books in chemistry." Since a large part of the chemical researcher's time is spent in the library searching out previous reports on different subjects of interest to him, a thorough knowledge of what type of information is contained in a particular volume and where to find that particular

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volume is essential. The serious chemistry student needs a complete familiarity with the use of Chemical Abstracts. This course might be offered as a Special Studies project, or more probably, the same lessons might be incorporated into the advanced chemistry courses by the assignment of papers and themes to be written. A few class periods should be devoted to instruction in the use of the chemistry library.

4) A "Chemistry Seminar" is offered by Little Rock University. This consists of the "presentation of papers, discussion, analysis and implications of experimental investigations in the natural sciences." This course is required for senior chemistry majors at LRU, and meets once a week for one hour of credit.

One of the most important skills the professional chemist should possess is the ability to correctly write and present a scientific paper on his research work. Therefore a seminar as mentioned above would serve a useful purpose.

Students enrolled in this course might possibly present their special studies reports, reports of research findings, or reports written for classes on special occasions. These reports could be presented at monthly, or bi-monthly Chemistry Club meetings and, in addition to providing programs for the club and promoting interest in it, this would give students experience in presenting papers. Constructive criticism could be offered by teachers and fellow students. One hour's credit for a given number of reports might be offered.

5) LRU, SCA, Rice, and Southwestern each offer a course in advanced, or theoretical organic chemistry. These courses study molecular structure and the elucidation of organic reaction mechanisms, and are designed to prepare the student for advanced organic chemistry at the graduate level. They also entail a literature survey of recent advances in the field.

This course would definitely be of immense value, especially to students aspiring to graduate level work in organic chemistry.

6) Rice and Southwestern have a course entitled "Instrumental Analysis." This is a required course for junior chemistry majors at Rice. Special emphasis is given to the principles and applications of modern instrumental methods in the areas of inorganic, organic, and physical chemistry.

Since the trend is more and more toward instrumental analysis and away from classical, tedious and time consuming methods, perhaps more instrumental techniques and experiments could be incorporated into existing courses, if a separate course is not feasible.

7) A course entitled "Laboratory Demonstrations in Chemistry" is offered by SCA. This course consists of "practical chemistry demonstrations for the science teacher." It includes lectures, laboratory, and library work.

This course would be useful not to chemistry majors especially, but to those wishing to teach elementary chemistry or natural science in high school or junior high. It might be offered as a special summer session of short duration.

Conclusion

It has generally been concluded by this committee that the Ouachita curriculum compares favorably with the schools of similar size that were studied. Of course, Rice University offers many courses which it would not be feasible to offer at a college our size.

If there is any weakness to be pointed out, it might lie in the need for an advanced Organic mechanisms class, or more practice in instrumental techniques.

Ouachita seemed to have a better program in Pre-Med chemistry (such as Physical Chemistry for Pre-Med students). The schools studied had no such program. Our Radiochemistry course is also unique among the schools examined.