

## World Yeast Congress

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## Bridging the gaps: An innovative and integrated undergraduate fermentation science course

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Undergraduate science is traditionally both taught and learned through disciplinary lenses. Often, students compartmentalize knowledge in courses and have difficulty making connections between disciplines. As brewing beer encompasses biology and chemistry, we (a physical chemist and a microbiologist) developed and team-taught an innovative and integrated undergraduate course on the science of fermentation. The course was taught during Transylvania University's May term where students take one intensive course for 5 weeks. The course explored the scientific principles of fermentation and was structured around students brewing standard 5-gallon batches of beers from malt extract. The course also covered the major characteristics of beer, the role of brewing ingredients/ processes and how they affect the final product, and

involved student measurements of various chemical and microbiological aspects of beer in the laboratory (e.g. microscopy, spectroscopy). Pre- and post-tests and attitudinal survey data from the students suggest that using this team-taught approach aided students to see the interconnectedness of biology and chemistry as they apply to brewing. At the end of the course students reported greater confidence in their ability to brew beer, increased understanding of beer and brewing in scientific terms, and the ability to identify beer styles bsed on taste, smell, and color. We can also report that the course affected two students deeply; one now works as a quality control chemist at a commercial brewery and one has become an avid home brewer

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