

**Nomination of J. Brandon Dixon for the  
CETL/BP Junior Faculty Teaching Excellence Award**

This packet contains:

- This cover page (1 page)
- Letter of nomination, by the School Chair (Dr. B. Wepfer) (2 pages)
- A reflective statement on teaching from the candidate (2 pages)
- Letter of support from a colleague, Dr. David Ku, who has observed the candidate in the classroom (1 page)
- Letters of support from five students (three undergraduate, two doctoral, all currently at Georgia Tech) (5 pages total)

(11 pages total)

Evidence of impact on engineering undergraduate students is included in other elements of the packet.

January 27, 2014  
CETL Junior Faculty Teaching Award  
**Nomination of J. Brandon Dixon**

Dear Selection Committee,

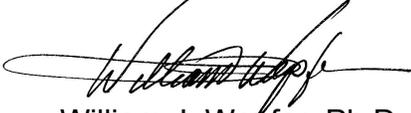
It is with great enthusiasm that I recommend Brandon Dixon for the CETL/BP Junior Faculty Teaching Award. Since his arrival at Georgia Tech, Brandon has consistently demonstrated a high level of competency as an educator, with a continual commitment to improving the learning experience of his students. Brandon arrived at Georgia Tech right around the time that the mechanical engineering undergraduate enrollment rapidly expanded. Two weeks after arriving at Georgia Tech, Brandon was given a class of 104 undergraduate students (14 of whom were remotely connected through distance learning sections) in his Fluid Mechanics course (ME 3340), perhaps the largest we have ever had for this course. In spite of this, he did remarkably well obtaining a teaching effectiveness score of 4.2 that semester. He has now taught this course 6 times, with sections continuously averaging around 90 students, all while achieving CIOS scores in the 4.0 - 4.5 range. Brandon has also taught ME 2016, a very project-oriented computational programming course, and received very high marks by the undergraduate students as well (4.3).

Because of his desire to improve student learning in these very large sections, Brandon applied and was selected to participate in the Class of 1969 Teaching Fellows Program. In working with CETL, he developed methods for helping enhance student participation and accountability in these large classes, and is now utilizing many of these techniques in the fluids course. Brandon was also selected this past summer by the office of the Vice Provost for Undergraduate Education to help pilot a student-faculty mentorship program, aimed at creating stronger interactions between faculty and students outside of the classroom. In discussion with Brandon, I know that he is often hosting undergraduate students over for meals in his home through programs such as this, as well as through his involvement as the faculty advisor for the Veritas Forum student organization on campus.

Brandon is continuously striving to improve as an educator. The first time he co-taught a newly designed graduate course in Biotransport with Dr. David Ku, he received a surprisingly low CIOS score. Brandon took these criticisms to heart and drastically revamped his material in the course, constantly factoring in student feedback in the development of the material. The next time he taught the course, his scores jumped to 4.3 and the enrollment for the course has been increasing ever since. Lastly, I think Brandon's commitment to education and teaching is reflected by the recent notification that we received indicating that Brandon will be receiving a prestigious NSF CAREER Award. This demonstrates Brandon's commitment to integrating education and research

in novel and exciting ways. It is without hesitation that I provide my support to Brandon for this outstanding award.

Sincerely,

A handwritten signature in black ink, appearing to read "William J. Wepfer". The signature is fluid and cursive, with a long horizontal flourish extending to the left.

William J. Wepfer, Ph.D.

Eugene C. Gwaltney, Jr. School Chair and Professor

## **J. Brandon Dixon Statement of Teaching**

I think the practice of teaching, whether that be in the context of training and mentoring graduate students in one's lab, or teaching a larger group of students as part of their educational curriculum, is one of the most rewarding experiences of being in academics. While all of us through our research programs seek to grow our sponsored funds and generate high impact publications, I believe our highest calling is the of training students to think critically, independently, and creatively, thus leaving behind a legacy of future researchers and engineers that extends beyond or own publications. This training should be happening both in the classroom setting, in research group meetings, and one-on-one with students in the lab. This defines my philosophy of teaching. While the strategies implemented in each of these cases may be different, the overall goal is the same – to help students develop a skill set that enables them to understand a body of knowledge and to apply this knowledge to problem-solving through critical, independent, and creative thinking.

While developing pedagogical skills is a lifelong process, I have had the benefit of starting this process very early in my academic career. In fact it was several teaching opportunities that I had as a graduate student that convinced me to continue in my PhD and the path towards a tenure-track faculty position in academics. While I was excited about the opportunity to start teaching when I arrived at Georgia Tech, I was not prepared for some of the challenges that are presented with the ridiculously large classes sizes we were experience in Mechanical Engineering due to a rapid increase in students enrollment. While I went to a major state university, my upper-level engineering course usually had around 40 students in them. Many of the ideas and strategies I had developed about teaching and student accountability were just not going to work in a class of over 100 students, 20 of whom were connecting into the classroom via video monitors from Statesboro and Savannah. I soon realized that this is where education was headed and that I could either complain or adapt. When I head about the Teaching Scholars Program offered by CETL, I jumped at the chance to participate. Through this program I was able to discuss with my peers and those with a vast amount of teaching experience, the challenges I was encountering and ways to creatively overcome them. As a result of this I have implemented a strategy that involves briefly and regularly assessing student progress through quizzes, interactive group work, online example videos of me working extra problems that can be accessed outside of class, and Skype office hours to enhance their availability for off-campus students and students that work.

In addition to graduate and undergraduate instruction in the context of the classroom, I also see teaching as an activity that should regularly be happening in the lab to develop researchers. I have annual retreats with the students (undergraduate, graduate, and post-docs) where we spend a day setting goals, evaluating past progress, and participating in a workshop that focuses on a specific skill (e.g. scientific writing, developing presentation skills, teaching, experimental design, resume/CV building. I also have a very strong desire to mentor undergraduate students and give them opportunities to see their engineering training realized into real-world problems that address human health. My convictions for this are due largely due to my own experiences as an undergraduate student who had the opportunity to work in a research lab. Until this, I had no exposure to academic research and was not even considering this career path. Not only have the undergraduate students in my lab proven to be quite productive thus far, the opportunity for my graduate students to learn how to mentor and guide a student has been invaluable for their own growth as future leaders in research. I currently have 4 undergraduates working in the lab and 17 undergraduates who have previously worked in the lab, most for over a year. Six of these former undergraduate students have enrolled in graduate programs at Johns Hopkins, Yale University (2), Emory, Georgia Tech, and Stanford. As a group they have received over \$40K in undergraduate

research fellowships, received authorships on 2 peer-reviewed journal articles, given a podium presentation at the ASME Summer Bioengineering Conference, and had 9 authorships on conference abstracts.

Lastly, I am very passionate as a faculty at providing the “other education” for students while they are in college. I serve as the faculty advisor for the Georgia Tech Veritas Forum on campus. Through this, I have the student leadership team (about 10-15 students) over to my house once per month where I cook them dinner and we discuss broad issues related to leadership and putting these principles into practice. Through these students, the organization now puts on engaging events once per semester on campus, attracting 500-700 attendees, to discuss issues pertaining to faith, science, philosophy, and life. This summer, I got the opportunity to help pilot a student-faculty mentorship program. Through this program, I extended an invitation to all of my undergraduates to come over to my class to discuss their experiences at Georgia Tech and ways in which the faculty can enhance student-faculty relationships and interactions on campus. Lastly, I enjoy hosting international students from my classes to my home during Thanksgiving and Christmas, as most of them are not able to go home during the breaks. This has always been a fun chance to share culture with them. While it is impossible to have these kind of relationships with every student in the class, I have found it helps to keep me grounded and understand the needs and challenges of our undergraduate students.

In conclusion, I have come to see my responsibilities in research and teaching not as two separate entities, but rather two disciplines that can synergistically work together. When concepts taught in the classroom are inspired by actual research carried out in the lab, the student will gain an appreciation for and better grasp the things they are supposed to learn. When a researcher is in the classroom energetically teaching his students, and teaching them well, he or she has the opportunity to train and guide tomorrow’s brightest minds into a graduate degree and research career. Without research, our teaching soon becomes irrelevant and archaic. Without teaching, research is left without anyone to pick up the mantle and further its cause.



David N. Ku, M.D., Ph.D.  
Regents' Professor of Mechanical Engineering  
Lawrence P. Huang Chair for Engineering Entrepreneurship  
George W. Woodruff School of Mechanical Engineering  
Georgia Institute of Technology  
Atlanta, GA 30332-0405

January 31, 2014

To the CETL Honors Committee,

I am writing a letter of nomination for Brandon Dixon who is applying for the CETL Teaching Award.

I have known Brandon for approximately 5 years as an Assistant Professor in Mechanical Engineering. We have been co-teaching a course on Biotransport/Biofluid Dynamics for 3 years. Thus, I have had the ability to observe his teaching directly. In the first year, Brandon reflected the difficulties in presenting graduate level material to our brightest students. He came to me with a genuine desire to improve. He worked on developing a more interactive teaching style instead of merely lecturing to the board. He now engages the students with challenging questions to stimulate thought. He is working on gaining more confidence at anticipating areas of difficulty for students and realizing that active learning by the students is better than passive recitation. He has obtained good teaching evaluations that have improved significantly in our jointly taught course.

Brandon is a conscientious teacher who likes working with undergraduate and graduate students. The letters from his advisees show his efforts and the appreciation by the students. I strongly recommend Brandon for the CETL Teaching Award.

Sincerely,

A handwritten signature in black ink that reads "David N. Ku".

David N. Ku, MD, PhD  
Regents' Professor

To Whom It May Concern:

My name is Marie Harber. I am a fourth year senior in Mechanical Engineering. I had the wonderful opportunity to take two classes with Dr. Dixon during my time here at Tech, Numerical Methods and Fluid Dynamics. The time I spent in his class, and my interactions with him outside of the classroom, have led me to rate him as the best teacher I have taken here at Georgia Tech. How do I define "best"? There are a number of criterion I believe that distinguish a "good" teacher from a "great" one.

The first criterion is a passion for teaching. This passion is shown in the time the teacher is willing to spend with every student both inside, and outside, the classroom. I was definitely not in the top of the Fluid Dynamics class, but Dr. Dixon went out of his way to make sure that he took the time to answer all of my questions and provide follow up explanations to ensure my thorough understanding of the material. As a result, I thoroughly learned the subject, and Fluids became my favorite class. During the course of the semester, I had a meeting with Dr. Dixon to discuss my grade. His perfect honesty during that meeting provided a huge stimulus to me, which helped me to overcome my test taking anxiety, allowing me to succeed, not only in that class, but in all my subsequent courses.

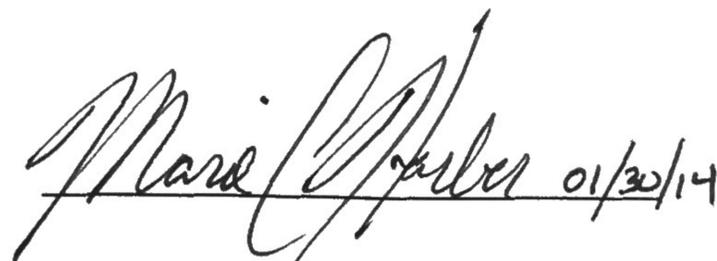
The second criterion that I associate with greatness is a teacher's ability to make the lecture material and textbook examples relevant to the student. Dr. Dixon accomplished this by bringing in lectures which applied the fluids and numerical methods concepts that we were learning to current research being done in his lab. He utilized videos and analogies from my daily experience to explain abstract concepts. This use of technology in the classroom to facilitate learning was a salient point of Dr. Dixon's approach to teaching. He kept an open forum which allowed students to ask and answer questions. He worked out example problem solutions on his tablet and posted the videos for our use.

The third, and last, criterion is the ability to provide an atmosphere that stimulates a student's interest. Group study sessions, office hours, and supplementary material are only some of the ways that Dr. Dixon used to accomplish this end. His frequent quizzes prevented last minute cramming for exams, only further enhancing the whole learning experience.

As a senior, I often look back to evaluate how I have spent the last four years of my life. The part that Dr. Dixon had in those years is a large one. He has influenced my choice of career paths, and has sparked, what I hope will be, a life-long interest in the subjects he taught. As a senior, I also want to give back and pass on the best parts of Tech. This is why, I take every chance I get to recommend Dr. Dixon to my friends as a "must take" professor at Georgia Tech.

Sincerely,

Marie C. Harber  
Mechanical Engineering  
Class of 2014

A handwritten signature in black ink that reads "Marie C. Harber" followed by the date "01/30/14". The signature is written in a cursive style.

To whom this may concern,

I am a fourth year Mechanical Engineering student at Georgia Tech who has taken many major specific courses. One of the more difficult classes that I have taken thus far was fluid dynamics; thankfully, I had a great teacher to help me understand the material. Dr. Brandon Dixon was such an amazing professor and exceptional person during that course, that I applied, and was admitted, into his research lab. From my experience, I can say without a doubt, that Dr. Dixon was one of the best teachers I have ever had.

The first time that I saw Dr. Dixon teach was not actually in a classroom setting, but rather when he was speaking in front of the large audience in The Veritas Forum. There were other speakers at this event, however, the main message that I came away with was spoken by a younger looking red-haired professor. His message at that forum was that, with the right planning and willpower, you can be successful in the world of academia and still be supportive and active within your family. A few months later, I was pleasantly surprised to see that the same person who made such an impact on me was standing in front of the classroom instructing on a different subject.

From the very first day in Dr. Dixon's class, it was obvious that he was a different caliber of teacher. He had tailored the class based on previous classes' feedback to create a better learning method for the material. Since fluid dynamics builds on itself, rather than having a few spread out tests throughout the semester, he gave us heavily weighted weekly quizzes to insure that we were keeping up with the material. He also used in class videos and related our studies to real life applications in order to keep everyone's interest levels high. The passion that he had about the material was also very obvious and made it so that I actually enjoyed going to class.

Of all the professors I've had at Georgia Tech, Dr. Dixon was definitely the most approachable. Unfortunately, I had class during his scheduled office hours; however, he was always very open to appointments and provided extra office hours right before the midterm and final. When I did go see him for help, he was very understanding and tried different techniques to explain each problem. We talked, not only about fluids, but about how he went hang gliding last weekend or how his kids were doing and other more personal events that made me feel as if I was talking to a friend and not just a professor.

Though I have only been researching under him for a few weeks, I can already tell that he is going to be a great research adviser as well. He seems to care deeply about the project I am doing and is always helpful when I need direction. I really appreciate the fact that he does not micromanage me, but rather treats me with respect and offers advice when I ask. Overall, Dr. Dixon has shown to excel in all areas of teaching inside and outside of the classroom and is the perfect recipient for the CETL Teaching Award.

Sincerely,

A handwritten signature in cursive script that reads "Thomas Spencer". The signature is written in dark ink and is positioned above the printed name.

Thomas Spencer

Shreyas Kousik  
800 Fowler St NW  
Atlanta GA, 30313  
[shreyas.kousik@gmail.com](mailto:shreyas.kousik@gmail.com)

29 January 2014

To the Junior Faculty Excellence Award Committee:

I would like to recommend Dr. Brandon Dixon for the CETL/BP Junior Faculty Excellence Award.

I am Shreyas Kousik, a 4<sup>th</sup> year mechanical engineering student here at Georgia Tech. Over the course of my studies, I've had the pleasure of taking two classes taught by Dr. Dixon: Numerical Methods (Spring 2013) and Fluid Mechanics (Fall 2013). In each of these classes, after a semester of intense work and satisfying learning, I earned an A.

In Numerical Methods, Dr. Dixon provided a thorough overview of the relations between computation and engineering. For example, we used Newton-Raphson iteration to find realistic beam deflections, instead of roots of meaningless equations. Incidentally, I have used Dr. Dixon's teaching of Newton-Raphson iteration to better understand finite element analysis in my undergraduate research. Ultimately, Dr. Dixon taught me concepts that I still use months after finishing the course.

My experience in Numerical Methods was positive enough that I enrolled in his Fluid Mechanics course the following semester. His curriculum was practical even while covering ephemeral concepts such as stress elements and Navier-Stokes equations – I know now how a siphon works, where pumps need to be placed on oil pipes, and why leaves sink in swirling tea. With these concrete examples, Dr. Dixon stimulated my interest and accelerated my understanding.

However, Dr. Dixon's practical teaching style is not his only strength. I found him very relatable. He was always available after class, and provided concise and clear explanations for anything from high-level concepts to low-level algebra. In addition, Dr. Dixon was very welcoming to all students, especially those studying abroad or at Tech for the holidays. He consistently invited everyone to dinners and campus events to help us feel like a part of the Georgia Tech family. Considering that Fluid Mechanics was a class of nearly 150 students, his personal approach required immense commitment, yet was incredibly successful.

Overall, I could not recommend any other professor more highly for this award. I have never connected with another professor so well, either academically or socially. Dr. Dixon is not just a teacher, but also a friend to his students.

Sincerely,



Shreyas Kousik

January 25, 2014

Dear Dr. Petrovic,

I am writing to enthusiastically recommend Dr. Brandon Dixon for the CETL/BP Junior Faculty Teaching Excellence Award. I'm now a second year PhD student in the Biomedical Engineering department at GT/Emory. I audited Dr. Dixon's ME3340 Fluid Mechanics course, and also took his BMED6720 Biotransport course. Sincerely, it is an honor to be asked - this is perhaps an opportunity to repay what I consider a debt for the kindness Dr. Dixon showed as my professor.

I first need to put my recommendation in context. When I began in Fall 2012, I was among the only students in my class with zero engineering background, and I'd also been out of school for five years. I chose to join a lab focused on fluid mechanics (under Dr. Ajit Yoganathan), despite never having taken a fluids course before. Though I didn't quite comprehend it at the time, this was a massive gamble.

At an academic advising session during my orientation, I met Dr. Dixon. He listened as I explained my story. He invited me to audit his ME3340 Fluid Mechanics course. He offered to have my homeworks graded weekly, and to grade my exams himself. Throughout the course, I struggled to pick up the most elementary engineering concepts ("What is this shear thing?"), and re-learn basic mathematics ("Polar coordinates... what are those again?"). I leaned on Dr. Dixon, bugging him after lectures and at office hours to discuss my countless questions. He worked with me with a kindness and patience that I have otherwise never seen in academia. With his help, I excelled in the course.

I wasn't the only student he made extra effort for. He set up a Facebook group for the class, where students could post questions/answers to one another, and Dr. Dixon would frequently chime in with his own answers. He would also create video work-throughs to textbook problems and post them online upon request.

When I went on to his graduate level course, BMED6720, I continued to rely on his support. Again, I owed a lot of my success to the time he took to work with me outside the classroom. Today, it appears the gamble I took by joining the lab I did is paying off. But I believe without stumbling on Dr. Dixon when I did, it probably would not have. I would have never gotten my feet on the ground as an engineering graduate student. It's not a stretch to say I might not still be in school today without his support.

Of course, I should also mention that his teaching *in* the classroom is very effective. He is definitely an expert. His lectures are always very thoughtfully planned, and delivered with an engaging style. His in-class teaching ability alone sets him apart from most other professors. But ultimately, what really sets Dr. Dixon apart in my mind is his uncommon understanding and patience, beyond the classroom. These attributes made a tremendous difference in my life, and I believe make him worthy of the CETL/BP Junior Faculty Teaching Excellence Award. Thank you,



Eric Pierce  
National Science Foundation Graduate Research Fellow  
Biomedical Engineering PhD Student  
Cardiovascular Fluid Mechanics Laboratory  
Georgia Institute of Technology/Emory University

Greetings Selection Committee,

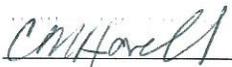
I am a second year PhD student in the Biomedical Engineering department here at Georgia Tech. I first met Dr. Dixon during the graduate school recruitment process two years ago. Dr. Dixon stood out to me then because he was actively engaged in getting to know the students. Dr. Dixon was enthusiastic about the program and willing to have actual conversations with the new students about graduate school and careers in research.

I took Dr. Dixon's graduate level Biotransport class in the spring of 2013. The class exceeded my expectations, and has been by far the most useful graduate course I have taken. It is obvious that Dr. Dixon invests time into developing his courses. He was always prompt and prepared to present even the most difficult material clearly and concisely. Additionally, he was always willing to take the time to meet with students who were struggling individually.

Good teachers are prompt, prepared, clear and fair. Dr. Dixon is a great teacher because he connects with his students in a genuine way. When I was worried about passing my qualifying exams, Dr. Dixon posted all of his undergraduate course material on our course website so that I (and other students) could use it to review. When I had questions about my research project, Dr. Dixon would stay after class to discuss potential solutions with me. Even now, a year after taking his class, Dr. Dixon remains a valuable and active resource for me and other students.

I fully support Dr. Dixon's nomination for the CETL Junior Faculty Teaching Excellence Award. Dr. Dixon is a truly excellent teacher who genuinely cares about the success of his students, both in and out of class.

Sincerely,



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Candice Hovell

1/29/2014