

3+2 Chemistry and Packaging Articulation Agreement

Between
Michigan State University
and
North Carolina Central University

1. Preamble

The purpose of this articulation agreement is to provide a basis for a cooperative relationship between Michigan State University (MSU) and North Carolina Central University (NCCU) to benefit students who desire to earn a bachelor of science (BS) in chemistry and a plan A or B master's (MS) in packaging. This relationship arose from discussions as part of the Alliance for Expanding Pathways to the Professoriate developed between faculty and administrators at MSU and several minority-serving institutions, including NCCU. We envision this partnership contributing to ongoing efforts to enhance diversity within MSU and the packaging profession, as well as providing an opportunity for NCCU chemistry students to find fulfilling research and advanced education opportunities in the packaging field, especially in sustainable packaging materials.

2. General purposes

The purpose of this articulation agreement is to provide a basis for a cooperative relationship between MSU and NCCU to benefit students who desire to earn a BS in chemistry and a MS degree in packaging from MSU. Under the 3+2 program, a student first completes 95 credits of course work at NCCU, after which they enroll at MSU to complete at least an additional 30 credits of coursework at MSU to obtain a MS (plan A or B) degree in packaging. The BS degree will be conferred by NCCU, and the MS degree will be conferred by MSU.

3. Specific activities to be pursued and implementation plans

Activity 1. Recruiting NCCU students.

From MSU School of Packaging, the director of graduate studies and the undergraduate advisor will share responsibility for this activity by preparing promotional materials, answering questions from interested students and potentially traveling to NCCU for recruiting visits.

Activity 2. Advising students at NCCU.

Designated School of Packaging faculty and/or the undergraduate advisor, as well as NCCU academic advisors, will advise interested NCCU students on course selection while in residence at NCCU to ensure they stay on track to meet requirements for both degrees.

Activity 3. Advising students at MSU.

The undergraduate advisor and director of graduate studies will have shared responsibility to advise 3+2 students while in residence at MSU. This includes course selection, plan maintenance, processing any needed overrides, planning for summer semesters, and networking and career placement.

Activity 4. Cross-institutional communication during undergraduate study at MSU.

MSU and NCCU advisors will have shared responsibility to ensure problems arising for students during study at MSU (e.g., dropped classes, medical withdrawal, poor grades) are addressed collaboratively by both institutions. MSU advisors have responsibility to make timely reports to the NCCU advisor on student progress. In the event a 3+2 student encounters problems during study at MSU, MSU advisors must include NCCU advisors in any intervention.

4. University units involved

This agreement will involve the following MSU units: School of Packaging, College of Agriculture and Natural Resources, and MSU's Graduate School.

This agreement will involve the following NCCU unit: Department of Chemistry and Biochemistry.

5. Parameters of the agreement

Students in NCCU chemistry degree track may transfer and apply 25 credits earned while enrolled as a graduate student in MSU's School of Packaging to complete degree requirements for a BS in chemistry from NCCU.

NCCU students are guaranteed admission to MSU provided:

- a. The student has submitted a complete application for admission to Michigan State University. Students should complete the graduate application.
- b. The student has a 3.0 or higher grade point average on a four-point scale.

NCCU students will be admitted as graduate students and coded as "PACK_NOGR" until the initial 25 credits are completed fulfilling the BS chemistry degree requirements. Students will then be re-classified as traditional graduate students.

Students can expect to graduate with a BS degree from NCCU provided:

- a. They complete the required coursework as described in addendum one or two.
- b. If, for any reason, an NCCU 3+2 student withdraws from MSU prior to completion of the 120 credits required for the BS degree (addendum one or two), the student may return to NCCU to complete the BS degree by fulfilling credit, course work, and other requirements. The student may transfer MSU semester credits to NCCU, provided a 2.0 or higher is earned in each class.

Students can expect to graduate with a MS (plan A or B) degree from MSU provided they complete the requirements described in addendum three or four. Briefly, this entails finding an advisor and completing 30 credits of coursework (more than half of the credits must be 800-level or higher).

Once enrolled in the MS program at MSU, progress through the degree will be governed by the policies and academic regulations for all MS students as detailed in the [School of Packaging's Graduate Handbook](#). Most importantly, although the curriculum outlined in Addendums 3 and 4 can be completed in a single academic year, there is no specific requirement that students follow this timetable.

Addendum One: Curriculum and requirements for BS in chemistry from North Carolina Central University, option A thesis.

Addendum Two: Curriculum and requirements for BS in chemistry from North Carolina Central University, option B non-thesis.

Addendum Three: Curriculum and requirements for MS (plan B) in packaging from Michigan State University.

Addendum Four: Curriculum and requirements for MS (plan A) in packaging from Michigan State University.

Recognizing changes in curricula and course content are inevitable, each institution agrees to discuss with the other institution all curriculum changes affecting this agreement before changes are implemented.

This document, including its addenda, constitutes the entire agreement between parties, and all prior discussions, agreements, and understandings, whether verbal or in writing, are merged in this document. Furthermore, the agreement is not considered to be a contract creating legal and financial relationships between parties. The agreement is designed, rather, to facilitate and develop a genuine and mutually beneficial relationship.

6. Funding Arrangements

While pursuing their undergraduate degree, NCCU will be considered the home school. The home school is responsible for coordinating financial aid and reporting a student's enrollment information to the National Student Loan Data System (NSLDS) for students enrolled under this agreement.

NCCU students transferring to MSU will be eligible for Michigan in-state tuition for coursework towards the packaging MS (plan A or B).

7. Duration of the agreement

This agreement shall become effective as of the last date of signatures of both parties and shall remain in effect for five years following that date.

8. Termination

The agreement may be terminated by either party with a minimum of 120 days written notice. Should a decision be made to modify or dissolve this agreement, students who are already attending MSU at the time will be permitted to continue as long as their academic performance remains in good standing.

9. Review and Evaluation

A review of this agreement and the resulting programs will take place every five years by the representatives from both institutions. The MSU School of Packaging Graduate Committee and Curriculum Committee will be responsible for carrying out this evaluation for MSU School of Packaging.

10. Nondiscrimination

Both parties subscribe to a policy of equal opportunity and do not discriminate on the basis of race, color, gender, age, height, weight, marital or familial status, ethnicity, religion, national origin, or disability.

11. Communication between the parties

Official communications between parties should take place via email, with informal communication via phone.

MSU School of Packaging Contacts:

Director, Matt Daum, daummatt@msu.edu, 517-353-2478

Graduate Director, Laura Bix, bix@msu.edu, 517-355-4556

Graduate Coordinator, Cathie Allison, allisonc@msu.edu

Undergraduate Advisor and MS Plan B Advisor, Aaron Tucker, tucker68@msu.edu, 517-355-9580

NCCU Department of Chemistry & Biochemistry Contacts:

Professor & Chair, Abdul K. Mohammed, Ph.D., amohammed@nccu.edu, 919-530-6351

Professor & Graduate Coordinator, Fei Yan, Ph.D., fyan@nccu.edu, 919-530-7518

North Carolina Central University

David Jackson, Ph.D.
Provost & Vice Chancellor for Academic Affairs

Mohammad Ahmed, Ph.D.
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Thomas Jeitschko, Ph.D.
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Kelly Millenbah, Ph.D.
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Matthew Daum, Ph.D.
Director and Professor, School of Packaging

Anthony Krolak, Associate Director
Office of Financial Aid

Lynn Kriser
Office of General Counsel

**Addendum One: Curriculum and requirements for B.S. in chemistry
Years one-three at NCCU (including year four of MS option A –Thesis)**

Three-Year Curriculum Plan in: BACHELOR OF SCIENCE DEGREE IN CHEMISTRY, ACS CERTIFIED

| Freshman Year (NCCU) | | Fall | | Spring | | | |
|----------------------|------|-----------------------|-----------|----------------------|------|----------------------------|-----------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| *CHEM | 1100 | Gen. Chem. I | 4 | +CHEM | 1200 | Gen. Chem. II | 4 |
| *=MATH | 2010 | Calc & Anal Geom. I | 4 | *=MATH | 2020 | Calc & Anal Geom. II | 4 |
| *ENG | 1110 | English Composition I | 3 | *ENG | 1210 | English Composition II | 3 |
| *UNIV | 1100 | First year seminar | 2 | =PHYS | 2305 | Gen. Phys. For Sci & Eng I | 3 |
| *PEDU | 1541 | Fitness | 2 | =PHYS | 2410 | Lab I | 1 |
| *HEDU | 1531 | Health | 2 | | | | |
| | | | | | | | |
| | | | | | | | |
| Total | | | 17 | Total | | | 15 |

| Sophomore Year (NCCU) | | Fall | | Spring | | | |
|-----------------------|------|---------------------|-----------|----------------------|------|----------------------------|-----------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| +CHEM | 3100 | Org. Chem. I | 3 | +CHEM | 3120 | Org. Chem. II | 3 |
| +CHEM | 3330 | Org. Chem. Lab I | 1 | +CHEM | 3340 | Org. Chem. Lab. II | 1 |
| +CHEM | 2020 | Quant. Analysis | 4 | +CHEM | 4400 | Instrumental Analysis | 4 |
| =PHYS | 2310 | Gen. Phys.II | 3 | *HIST | 1320 | World Societies | 3 |
| =PHYS | 2420 | Lab I or II | 1 | *MFL II | | Modern Foreign Language II | 3 |
| +CHEM | 3200 | Inorganic Chemistry | 4 | *MSCM | 1250 | Elem. Of Speech (SI) | 3 |
| Total | | | 16 | Total | | | 17 |

| Junior Year (NCCU) | | Fall | | Spring | | | |
|----------------------|------|-----------------------------------|-----------|----------------------|--------------|---------------------------|-----------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| +CHEM | 4010 | Phys. Chem. I | 4 | +CHEM | 4020 | Phys. Chem. II | 4 |
| +CHEM | 4900 | Applied Math | 2 | *HUM | 2410 or 2420 | Arts & Humanities I or II | 3 |
| # | | General Elective | 3 | &CHEM | | Advanced Elective | 3 |
| *BIOL | 1202 | Prin of Biol. Molecules and cells | 4 | +CHEM | 4800 (WI) | Chem. Res. Literature | 3 |
| CHEM | 4500 | Biochemistry I | 3 | *SOSC | | GEC Requirement | 3 |
| CHEM | 4520 | Biochemistry I Lab | 1 | | | | |
| Total | | | 17 | Total | | | 16 |

| Year Four MSU | | Fall | | Spring | | | |
|----------------------|-----|---|--------|----------------------|------------|--|--------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| PKG | 801 | Packaging Materials | 4 | PKG | 803 | Packaging Distribution & Dynamics | 2 |
| PKG | 860 | Research Methods | 3 | PKG | 455 | Food Packaging | 4 |
| STT | 464 | Statistics for Biologists Or similar | 3 | PKG | 815 or 805 | Permeability and Shelf Life or Advanced Packaging Dynamics | 3 |
| PKG | 899 | Master's Thesis Research: Project Development - Identification of Research topic and initiate Literature research | 1-3 | PKG | 804 | Packaging Processes | 2 |

| | | | | | | | | |
|--|------------|---------------------------------------|-------|--|--|-----|--|----|
| PKG | 490 or 890 | Directed Studies or Independent Study | 1-2 | | PKG | 899 | Master's Thesis Research: Project Development – Complete Literature review and develop proposal | 2 |
| Identify the guidance and mentoring committee. Meet with the committee by the end of the term | | | | | Needs approval from the mentoring committee. Meet during the second half of the term. | | | |
| Total credits | | | 12-14 | | Total credits | | | 13 |

Notes: 95 credits to be completed at NCCU and 25 credit hours to be completed at MSU.

Courses to be transferred from MSU and their equivalents at NCCU

| MSU course to be transferred | | NCCU course equivalent | | |
|---|---|---------------------------------|---|-------------|
| PKG 801 Packaging Materials | 4 | CHEM 4920 Senior Honors Seminar | 2 | Senior Year |
| PKG 860 Research Methods | 3 | PHIL 2210 Ethics | 3 | Senior Year |
| STT 464 Statistic for Biologists (or similar) | 3 | Elective | 2 | Senior Year |
| PKG 803 Packaging Distribution & Dynamics | 2 | Advanced CHEM Elective | 3 | Senior Year |
| PKG 455 Food Packaging | 4 | Advanced CHEM Elective | 4 | Senior Year |
| PKG 825 Polymeric Packaging Materials or PKG 899 Master's Research or PKG 490 Directed Studies or PKG 890 Independent Study | 4 | CHEM 4700 Research | 3 | Senior Year |
| PKG 815 Permeability and Shelf Life | 3 | BIOL Elective | 3 | Senior Year |
| PKG 804 Packaging Processes | 2 | Advanced CHEM Elective | 3 | Senior Year |

**Addendum Two: Curriculum and requirements for B.S. in chemistry
Years one-three at NCCU (including year four of MS option B –non-thesis)**

Three-Year Curriculum Plan in: BACHELOR OF SCIENCE DEGREE IN CHEMISTRY, ACS CERTIFIED

| Freshman Year (NCCU) | | Fall | | Spring | | | |
|----------------------|------|-----------------------|-----------|----------------------|------|----------------------------|-----------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| *CHEM | 1100 | Gen. Chem. I | 4 | +CHEM | 1200 | Gen. Chem. II | 4 |
| *=MATH | 2010 | Calc & Anal Geom. I | 4 | *=MATH | 2020 | Calc & Anal Geom. II | 4 |
| *ENG | 1110 | English Composition I | 3 | *ENG | 1210 | English Composition II | 3 |
| *UNIV | 1100 | First year seminar | 2 | =PHYS | 2305 | Gen. Phys. For Sci & Eng I | 3 |
| *PEDU | 1541 | Fitness | 2 | =PHYS | 2410 | Lab I | 1 |
| *HEDU | 1531 | Health | 2 | | | | |
| | | | | | | | |
| | | | | | | | |
| Total | | | 17 | Total | | | 15 |

| Sophomore Year (NCCU) | | Fall | | Spring | | | |
|-----------------------|------|---------------------|-----------|----------------------|------|----------------------------|-----------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| +CHEM | 3100 | Org. Chem. I | 3 | +CHEM | 3120 | Org. Chem. II | 3 |
| +CHEM | 3330 | Org. Chem. Lab I | 1 | +CHEM | 3340 | Org. Chem. Lab. II | 1 |
| +CHEM | 2020 | Quant. Analysis | 4 | +CHEM | 4400 | Instrumental Analysis | 4 |
| =PHYS | 2310 | Gen. Phys.II | 3 | *HIST | 1320 | World Societies | 3 |
| =PHYS | 2420 | Lab I or II | 1 | *MFL II | | Modern Foreign Language II | 3 |
| +CHEM | 3200 | Inorganic Chemistry | 4 | *MSCM | 1250 | Elem. Of Speech (SI) | 3 |
| Total | | | 16 | Total | | | 17 |

| Junior Year (NCCU) | | Fall | | Spring | | | |
|----------------------|------|-----------------------------------|-----------|----------------------|--------------|---------------------------|-----------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| +CHEM | 4010 | Phys. Chem. I | 4 | +CHEM | 4020 | Phys. Chem. II | 4 |
| +CHEM | 4900 | Applied Math | 2 | *HUM | 2410 or 2420 | Arts & Humanities I or II | 3 |
| # | | General Elective | 3 | &CHEM | | Advanced Elective | 3 |
| *BIOL | 1202 | Prin of Biol. Molecules and cells | 4 | +CHEM | 4800 (WI) | Chem. Res. Literature | 3 |
| CHEM | 4500 | Biochemistry I | 3 | *SOSC | | GEC Requirement | 3 |
| CHEM | 4520 | Biochemistry I Lab | 1 | | | | |
| Total | | | 17 | Total | | | 16 |

Status after year three: 95 credits completed, eligible to transfer to MSU.

Summer semester after year three, optional MSU onboarding to include:

- I. Packaging Basics Short Course or PKG 101
- I. Participate in [SROP program](#)

| Year Four (MSU) | | Fall | | Spring | | | |
|----------------------|-----|--|--------|----------------------|-----|-----------------------------------|--------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| PKG | 801 | Packaging Materials | 4 | PKG | 803 | Packaging Distribution & Dynamics | 2 |
| PKG | 860 | Research Methods | 3 | PKG | 455 | Food Packaging | 4 |
| STT | 464 | Statistics for Biologists (or similar) | 3 | PKG | 815 | Permeability and Shelf Life | 3 |
| PKG | 825 | Polymeric PKG materials | 4 | PKG | 804 | Packaging Processes | 2 |

| | | | | | | | |
|-------|--|--|-----------|-------|------------|-------------------------------|-----------|
| | | | | PKG | 490 or 890 | Directed or Independent study | 1 |
| Total | | | 14 | Total | | | 12 |

Advising: During semester seven, the student works with the School of Packaging graduate director and advisor to prepare MSU graduate application, and develop a course of study, guidance committee (for option A thesis) and mentoring plan for the MS program.

MS Option A – Thesis: Semester Seven and Eight

Status: MS Option A: Students have completed 120 credits.

Courses to be transferred from MSU and their Equivalents at NCCU

| MSU course to be transferred | | NCCU course equivalent | | |
|---|---|---------------------------------|---|-------------|
| PKG 801 Packaging Materials | 4 | CHEM 4920 Senior Honors Seminar | 2 | Senior Year |
| PKG 860 Research Methods | 3 | PHIL 2210 Ethics | 3 | Senior Year |
| STT 464 Statistic for Biologists (or similar) | 3 | Elective | 2 | Senior Year |
| PKG 803 Packaging Distribution & Dynamics | 2 | Advanced CHEM Elective | 3 | Senior Year |
| PKG 455 Food Packaging | 4 | Advanced CHEM Elective | 4 | Senior Year |
| PKG 825 Polymeric Packaging Materials or PKG 899 Masters Research or PKG 490 or PKG 890 Directed or Independent Study | 4 | CHEM 4700 Research | 3 | Senior Year |
| PKG 815 Permeability and Shelf Life | 3 | BIOL Elective | 3 | Senior Year |
| PKG 804 Packaging Processes | 2 | Advanced CHEM Elective | 3 | Senior Year |

Addendum Three: Curriculum and requirements for MS (plan B) in packaging

Overview

Students will earn a MS (plan B) degree in packaging from MSU provided they complete the requirements described in this addendum. This includes completing 30 credits of coursework at the 400-level or higher, of which more than half of the 30 will be at the 800 level or higher.

The exact list of courses for each student will be determined by the student with their guidance committee (One faculty advisor plus graduate director), which will be assigned to the student as part of the graduate application process. Provided below is a possible schedule - students have the option of changing the composition of their guidance committee once they are enrolled in the MS program. To progress through the MS degree, students must adhere to the policies and academic regulations for all Packaging Science Plan B MS students as detailed in the [School of Packaging Graduate Handbook](#).

Most importantly, although the curriculum outlined below can be completed in a single academic year, there is no requirement that students must follow this timetable.

Examples demonstrating MSU Year Two options:

Example 1: Packaging Design and Application interest

| Graduate Year (MSU) | | Fall | | Spring | | | |
|----------------------|------------|---|-----------|----------------------|------------|--|----------|
| Course Prefix/Number | | Course Title/Actions | Credit | Course Prefix/Number | | Course Title/Actions | Credit |
| Pkg | 411 | Packaging Development Technology | 3 | Pkg | 421 | Virtual Design and Prototyping | 3 |
| Pkg | 452 or 817 | Medical packaging or Instrument for Analysis of Packaging Materials | 4 | Pkg | 470 | Packaging Sustainability | 3 |
| Pkg | 465 | Pkg Value Chain | 3 | Pkg | 805 or 815 | Advanced Packaging Dynamics or Permeability and Shelf Life | 3 |
| | | | | Final Exam | | | |
| Total | | | 10 | Total | | | 9 |

Example 2: Packaging Sustainability interest

| Graduate Year (MSU) | | Fall | | Spring | | | |
|----------------------|------------|---|--------|----------------------|------------|--|--------|
| Course Prefix/Number | | Course Title/ Actions | Credit | Course Prefix/Number | | Course Title/ Actions | Credit |
| Pkg | 465 | Pkg Value Chain | 3 | Pkg | 470 | Pkg Sustainability | 3 |
| Pkg | 875 or 817 | PKG Stability and Recyclability of Packaging Materials or | 3 | Pkg | 805 or 815 | Advanced packaging dynamics or Permeability and Shelf Life | 3 |

| | | | | | | | |
|--------------|-----|---|----------|--------------|------------|--|----------|
| | | Instruments for Analysis of Packaging Materials | | | | | |
| Pkg | 411 | Packaging Development Technology | 3 | Pkg | 880 or 480 | Life Cycle Assessment or Pkg Laws and Regulation | 3 |
| | | Final Exam | | | | | |
| Total | | | 9 | Total | | | 9 |

Example 3: Food Packaging interest

| Graduate Year (MSU) | | Fall | | Spring | | | |
|----------------------|-----|---|----------|-----------------------|------|--------------------------------|----------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | | Course Title | Credit |
| PKG | 456 | Packaging and Shelf Life of Perishable Food | 3 | PKG | 470 | Pkg Sustainability | 3 |
| | | | | PKG | 815, | Permeability and Shelf Life | 3 |
| PKG | 465 | Pkg Value Chain | 3 | Pkg | 421 | Virtual Design and Prototyping | 3 |
| PKG | 411 | Packaging Development Technology | 3 | MS Plan B Exam | | | |
| Total | | | 9 | Total | | | 9 |

Status: Students have completed at least 30 credits toward MS including up to 14 waived credits based on year four coursework

MS Plan B in packaging awarded by MSU

Addendum Four: Curriculum and requirements for MS (Plan A) in packaging science

Overview

Students will earn a MS (Plan A - Thesis) degree in packaging from MSU provided they complete the requirements described in this addendum. This includes completing 30 credits of coursework at the 400-level or higher of which more than half of the 30 will be at the 800 level or higher.

The exact list of courses for each student will be determined by the student with their guidance committee (one faculty advisor plus graduate director), which will be assigned to the student as part of the graduate application process. Provided below is a possible schedule. Students will have the option of changing the composition of their guidance committee once they are enrolled in the MS program. To progress through the MS degree, students must adhere to the policies and academic regulations for all Packaging Science Plan B MS students as detailed in the [School of Packaging Graduate Handbook](#).

Most importantly, although the curriculum outlined below can be completed in a single academic year, there is no requirement that students must follow this timetable.

Examples demonstrating Year Two options:

Example 1: Packaging Design and Application interest

| Graduate Year (MSU) | | Fall | | Spring | | | |
|----------------------|------------|--|--------|---|------------|---|----------|
| Course Prefix/Number | | Course Title/Actions | Credit | Course Prefix/Number | | Course Title/Actions | Credit |
| Pkg | 411 or 430 | Packaging Development Technology or Pkg for Fast-Moving Consumer Goods | 3 | Pkg | 421 | Virtual Design and Prototyping | 3 |
| Pkg | 452 | Medical packaging or | 4 | Pkg | 470 or 880 | Packaging Sustainability or Life Cycle Assessment | 3 |
| Pkg | PKG 860 | Research Methods | 3 | Pkg | 899 | Master's Thesis Research: Write results and discussion. | 3 |
| Pkg | 899 | Master's Thesis Research: Write Material and Methods sections | 2 | Defend thesis by end of semester | | | |
| | | Meet with committee as a follow-up for recommendations | | | | | |
| Total | | | | Total | | | 9 |

Example 2: Packaging Sustainability interest

| Graduate Year (MSU) | | Fall | | Spring | | | |
|----------------------|------------|--|--------|----------------------|-----|-----------------------|--------|
| Course Prefix/Number | | Course Title/ Actions | Credit | Course Prefix/Number | | Course Title/ Actions | Credit |
| Pkg | 411 or 421 | Packaging Development Technology or Virtual Design and Prototyping | 3 | Pkg | 470 | Pkg Sustainability | 3 |

| | | | | | | | |
|--------------|-----|--|---|-------------------|---|---|----------|
| Pkg | 875 | PKG Stability and Recyclability of Packaging Materials | 3 | Pkg | 880, 815 or 480 | Life Cycle Assessment, Permeability and Shelf Life, or Packaging Laws and Regulations | 3 |
| Pkg | 899 | Master's Thesis Research: Write Materials and methods. | 2 | Pkg | 899 | Master's Thesis Research: Write results and discussion. | 3 |
| Pkg | 860 | Research Methods | 3 | | | | |
| | | | Meet with committee as a follow-up for recommendations | | Defend thesis by end of semester | | |
| | | | | Final Exam | | | |
| Total | | | 11 | Total | | | 9 |

Example 3: Food Packaging interest

| Graduate Year (MSU) | | Fall | | Spring | | | |
|----------------------|-------------------|---|---|----------------------|---|--|----------|
| Course Prefix/Number | | Course Title | Credit | Course Prefix/Number | Course Title | | Credit |
| PKG | 456 | Packaging and Shelf Life of Perishable Food | 3 | PKG | 470, 480 or 880 | Pkg Sustainability, Laws and Regulations, or Life Cycle Assessment | 3 |
| PKG | 860 | Research Methods | 3 | Pkg | 411 or 421 | Packaging Development Technology or Virtual Design and Prototyping | 3 |
| PKG | 899 | Master's Thesis Research: Write Materials and methods. | 2 | Pkg | 899 | Master's Thesis Research: Write results and discussion | 3 |
| PKG | 411 or 421 or 465 | Pkg Development Technology or Virtual Design and Prototyping or Pkg Value Chain | 3 | | | | |
| | | | Meet with committee as a follow-up for recommendations | | Defend thesis by end of semester | | |
| Total | | | 11 | Total | | | 9 |

Status: Students have completed 30 credits toward MS with up to 16 waived based on Year Four course work.

MS in packaging awarded by MSU

Courses to be transferred from MSU and their equivalents at NCCU

| MSU course to be transferred | | NCCU course equivalent | | |
|--|---|---------------------------------|---|-------------|
| PKG 801 Packaging Materials | 4 | CHEM 4920 Senior Honors Seminar | 2 | Senior Year |
| PKG 860 Research Methods | 3 | PHIL 2210 Ethics | 3 | Senior Year |
| STT 464 Statistics for Biologists (or similar) | 3 | Elective | 2 | Senior Year |
| PKG 803 Packaging Distribution & Dynamics | 2 | Advanced CHEM Elective | 3 | Senior Year |
| PKG 825 Polymeric Packaging Materials | 4 | Advanced CHEM Elective | 4 | Senior Year |
| PKG 899 Master's Thesis Research | 3 | CHEM 4700 Research | 3 | Senior Year |
| PKG 815 Permeability and Shelf Life | 3 | BIOL Elective | 3 | Senior Year |
| PKG 804 Packaging Processes | 2 | Advanced CHEM Elective | 3 | Senior Year |

MSU course descriptions for courses that will be transferred to NCCU

PKG 455 Food Packaging

Description: Food package systems and their relationship to specific products and processes. Product composition, deterioration and packaging-solutions. Shelf life, packaging, and supply chain issues

STT 464 Statistics for Biologists

Description: Biological random variables. Estimation of population parameters. Testing hypotheses. Linear correlation and regression. Analyses of counted and measured data to compare several biological groups including contingency tables and analysis of variance.

PKG 801 Packaging Materials

Description: Physical and chemical properties of packaging materials; design, manufacture, performance and evaluation of packages.

PKG 804 Packaging Processes

Description: Integrated study of packaging and production operations, quality control, organization and control of machines. Interrelationship of products, packaging, machinery layout and efficiency, and quality issues.

PKG 805 Advanced Packaging Dynamics

Description: Shock and vibration. Distribution hazards and product fragility. Cushion performance and package design. Environmental measurement and simulation.

PKG 815 Permeability and Shelf Life

Description: Relationship between the storage life of packaged food and pharmaceutical products and the gas, moisture, and organic vapor permeability of packages in various environments.

PKG 825: Polymeric Packaging Materials

Description: Physical, mechanical and chemical properties of packaging polymers and multilayer structures; relationship between properties and performance of packaging materials and systems; processing of packaging plastics.

PKG 860 Research Methods

Description: Principles and expectations for responsible conduct of research in packaging. Integrity of the research process, critical thinking, scientific methods, proposal writing, and scientific communications.

PKG 899 Master's Thesis Research

Description: Master's thesis research.