THE NUCLEAR MEDICINE TECHNOLOGY CERTIFICATION BOARD, INC.

N M T C B

ANNUAL
EXAMINATION
REPORT
2016

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NMTCB 2016 Statistics

All Examinees

Total Number:	819	
Total Number Pass:	681	83.15 %
Total Number Fail:	138	16.85 %

Performance breakdown:				**Summary Statistics:**	
Pass:	657	80.22 %		Range of Scores	43-86
Pass with Distinction:	22	2.69 %		Average Score	76.94
Pass with Highest Distinction:	2	.24 %		Standard Deviation	3.49
Fail:	138	16.85 %		Median Score	77

First-Timers (Nuclear Medicine Program Graduates)

Total Number:	685	
Total Number Pass:	609	88.9 %
Total Number Fail:	76	11.1 %

Performance breakdown:				**Summary Statistics:**	
Pass:	596	87.00 %		Range of Scores	54-86
Pass with Distinction:	12	1.75 %		Average Score	77.4
Pass with Highest Distinction:	1	.15 %		Standard Deviation	2.96
Fail:	76	11.1 %		Median Score	78

Repeaters

Total Number:	89	
Total Number Pass:	40	44.94 %
Total Number Fail:	49	55.06 %

Performance breakdown:				**Summary Statistics:**	
Pass:	37	41.57 %		Range of Scores	67-86
Pass with Distinction:	2	2.25 %		Average Score	74.15
Pass with Highest Distinction:	1	1.12 %		Standard Deviation	3.35
Fail:	49	55.06 %		Median Score	74

Alternate Eligibility Examinees

Total Number:	45	
Total Number Pass:	32	71.11 %
Total Number Fail:	13	28.89 %

Performance breakdown:				**Summary Statistics:**	
Pass:	24	53.33 %		Range of Scores	43-84
Pass with Distinction:	8	17.78 %		Average Score	75.6
Pass with Highest Distinction:	0	0 %		Standard Deviation	6.86
Fail:	13	28.89 %		Median Score	76

NMTCB Annual Examination Overview
2016

Introduction

This summary report is intended to provide detailed information about the 2016 certification examination. The primary purpose of this report is to serve the needs of program directors and administrators. It contains a description of computer adaptive test (CAT) for classification, and provides detailed information about scaled scores and examination performance. The performance section includes a summary of examination data sorted by different groups of examinees as well as visual aids for the year 2016.

Computer Adaptive Test (CAT) for Classification.

In July 1996, the NMTCB began offering a computer adaptive test (CAT) for classification in association with ACT, Inc. The CAT for classification is designed to render a pass/fail decision. In a CAT of this type, examinees are NOT rank-ordered along a score scale in order to make a precise and accurate classification decision. In order to administer a CAT for classification, the items themselves are ranked at the decision point on the score scale according to their ability to classify accurately and quickly. Each item in the item pool is associated with the information on its difficulty (the proportion of examinees answering an item correctly) and discrimination (the ability of an item to distinguish between passing and failing individuals) levels. An item that has a difficulty level at or near the passing score and has good discrimination will be a better item for decision-making than another item that is too difficult or too easy or has little ability to discriminate between those examinees who should pass and those who should fail. ACT, Inc. psychometric staff obtained Item Response Theory (IRT) statistics for all items in the item pool.

A "classification" CAT is still adaptive in that an individual whose performance is significantly above or below the passing score will require fewer questions for classification. On the other hand, an individual whose performance is not clearly identified will need to answer more questions to demonstrate the required knowledge to pass the exam. The classification process will not be obvious to the examinee since there will be a certain number of unscored pretest questions that will be asked in order to obtain statistics on new questions for future use. For the classification CAT, the items that are administered to each and every candidate are the same type: there are no "difficult items for better examinees" or "easier items for poorer examinees." Each examinee answers a total of 90 items, and the items are different for each examinee.

Items for the classification CAT are selected in the following approximate proportions for each of four content domains of nuclear medicine technology. I. Radiation safety (15%), II. Instrumentation (20%), III. Clinical procedures (45%), and IV. Radiopharmacy (20%). Decisions for pass/fail were based on the passing score from the benchmark examination administered in September 1993. The September 1993 examination was the first test developed under the current test blueprint. The algorithm used in the classification CAT adjusts for differences in test form difficulty. For example, candidates that receive a CAT that is easier relative to the benchmark exam must answer more items correctly to receive a passing score. Conversely, if a candidate receives a set of items that is more difficult, they would be required to answer fewer questions correct to pass the exam. In essence, each CAT administered is equated so the passing level is appropriate for the set of items selected for administration to each candidate.

The CAT for classification, while providing a high degree of confidence in the pass/fail decision does not allow the same analysis of individual performance and subgroup performance obtained with the paper and pencil exam. In the past, because all examinees that sat at the same administration of a test took the same test, comparative information was obtained. Because the primary purpose of the CAT exam is to classify candidates as pass or fail, CAT for classification selects items that are optimal for minimizing errors in classification, a critical consideration in an occupation certification program. Candidates whose ability estimates are close to the passing score require more items to make a pass/fail decision; whereas, those that are clearly significantly above the pass/fail mark need fewer items. Candidates may not skip a test question, and are not permitted to return

to an item. Candidates are permitted to change their answers before moving on, at which time the item is scored by the computer.

Scaled Score Information:

Examination results are reported in terms of the scaled score, the mean scaled score, and a measure of the variability of the scaled score distribution -- the standard deviation.

As noted above, the main objective of the NMTCB CAT is to obtain a pass/fail decision with a high degree of precision. However it was recognized that there are occasions when there is a need to know whether an examinee's performance is close to the passing score or a distance from it. Consequently, scaled scores were developed and reported beginning midway through the 1997 testing cycle and subgroup performance in rank order was made available at this time, also. The scaled score is a transformation of the IRT value that is calculated based on the examinee's responses to the items presented during the examination. The scaled passing score was set to 75. That is, the ability estimate obtained from IRT required to pass the examination was “anchored” at 75. It is very important to note that the scaled score value is not a percentage value. Classifications of passing were set up as “Pass” for a scaled value of 75 through 81, “Pass with Distinction” for a scaled value of 82 through 84 and “Pass with Highest Distinction” for a scaled value of 85 or better.

Overall Examinee Performance:

Please refer to Table 1 for a general overview of the examination. This table presents the number of examinees who took the test, their average scaled score and the pass rate for eighteen years beginning 1996, the year CAT was started, to 2016.

Table 1. 1996 - 2016 NMTCB CAT Examinees

	Number of Examinees	Mean Scaled Score	Overall Pass Rate	Pass Rate for NMT Program Graduates
1996	671	78.9	88.1%	94.4%
1997	757	78.8	85.6%	92.4%
1998	664	78.4	83.8%	92.9%
1999	696	78.3	83.9%	93.0%
2000	792	78.2	81.0%	90.4%
2001	879	77.9	81.9%	90.1%
2002	1072	78.02	78.6%	88.4%
2003	1327	77.99	79.9%	87.1%
2004	1459	78.35	82.6%	91.6%
2005	1652	78.74	84.1%	90.0%
2006	1590	79.05	87.9%	93.7%
2007	1694	79.19	86.7%	91.7%
2008	1712	79.30	86.3%	91.7%
2009	1466	80.00	89.9%	94.3%
2010	1298	79.33	88.2%	92.4%
2011	1184	78.47	91.4%	94.9%
2012	1038	78.25	88.2%	91.3%
2013	958	78.26	88.2%	90.8%
2014	816	78.19	87.6%	89.6%
2015	808	77.92	86.8%	90.9%
2016	819	77.00	83.15%	88.9%

From Table 1, it can be seen that the number of examinees taking the test ranged from a low candidate volume of 664 in 1998 to a high candidate volume of 1712 in 2008. Since the beginning of the CAT, the average scaled scores of examinees have been steadily constant around 78.

Table 2. 2016 Overall Examinee Performance

	Total Number	Total Number Pass	Pass Percentage for Each Group	Total Number Fail	Fail Percentage for Each Group
Program Graduates	685	609	88.9%	76	11.1%
Repeat Examinees	89	40	44.94%	49	55.06%
Alternate Eligibility	45	32	71.11%	13	28.89%
All Examinees	819	681	83.15%	138	16.85%

Program Performance 2016: Table 3 (below) provides a percentile rank of the average score for each program for 2016. It provides each school's average score and the percentile rank for each score. For example, if the average scaled score of students graduating from a program is 79.00%, the program is ranked to the 78th percentile on the scale.

Table 3. Percentiles by school average

Average Score	Percentile
81.00	100%
80.75	98%
80.67	97%
80.50	95%
80.38	94%
80.00	92%
79.83	91%
79.63	89%
79.50	88%
79.42	86%
79.40	85%
79.38	83%
79.33	82%
79.29	80%
79.00	78%
78.89	77%
78.86	75%
78.77	74%
78.75	72%
78.67	71%
78.56	69%
78.53	68%
78.50	66%

Average Score	Percentile
78.44	65%
78.33	63%
78.29	62%
78.25	60%
78.22	58%
78.00	57%
77.80	55%
77.75	54%
77.71	52%
77.70	51%
77.69	49%
77.60	48%
77.50	46%
77.25	45%
77.20	43%
77.18	42%
77.13	40%
77.00	38%
76.80	37%
76.70	35%
76.67	34%
76.58	32%
76.57	31%

Average Score	Percentile
76.50	29%
76.44	28%
76.31	26%
76.25	25%
76.12	23%
76.00	22%
75.82	20%
75.60	18%
75.30	17%
75.17	15%
75.00	14%
74.86	12%
74.83	11%
74.57	9%
74.50	8%
74.14	6%
73.90	5%
73.75	3%
72.86	2%
70.00	0%

Group Performance 2016

All Examinees:

A total of 681 out of 819 examinees (83.15 percent), who attempted, passed the NMTCB certification examination in 2016 (Table 4). Out of those who attempted, 2 examinees (.24 percent) passed the examination with highest distinction, and 22 examinees (2.69 percent) passed the examination with distinction. A total of 138 examinees (16.85 percent) failed the examination in 2016. A frequency distribution of all examinees' scaled scores is also presented below (Graph 1).

Table 4. All 2016 Examinees

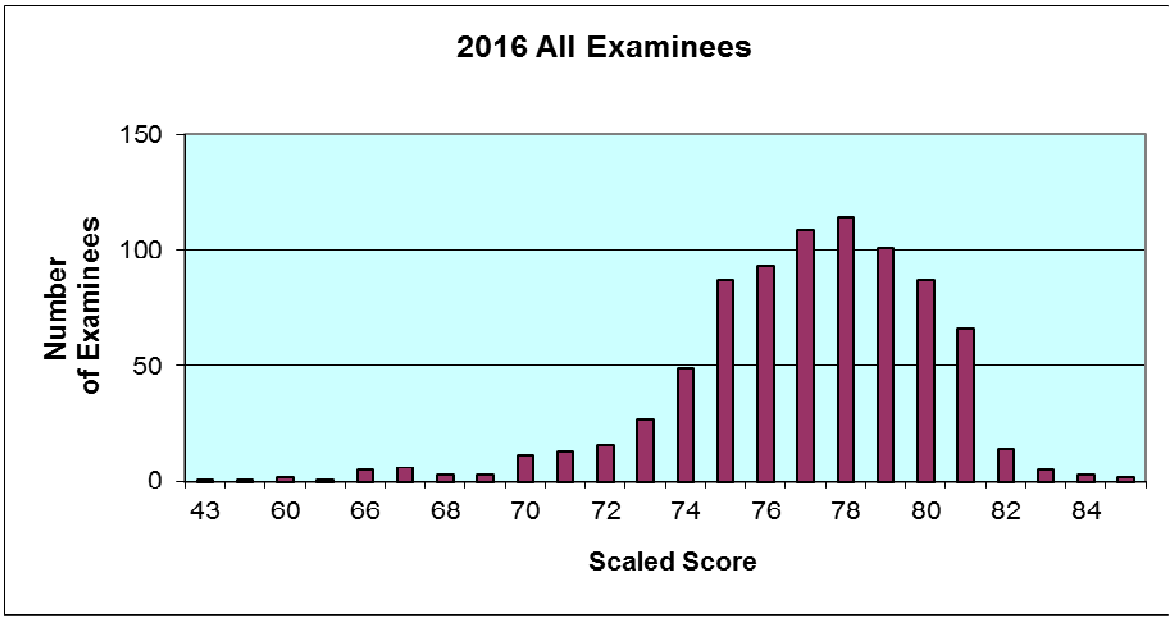
Total Number:	819	
Total Number Pass:	681	83.15%
Total Number Fail:	138	16.85%

Performance breakdown

Pass:	657	80.22%
Pass with Distinction:	22	2.69%
Pass with Highest Distinction:	2	0.24%
Fail:	138	16.85%

Range of Scores:	43 to 86
Average Score:	76.94
Standard Deviation:	3.49
Median scaled Score:	77

Graph 1. All 2016 Examinees



Repeat Examinees:

Eighty nine (89) examinees were repeat examinees in 2016 (Table 5). A total of 40 out of 89 examinees (44.94 percent) passed the examination. A total of forty nine (49) examinees (55.06 percent) failed the examination. One examinee (.15 percent) passed with highest distinction and two (2.25 percent) in this group passed the examination with distinction. A frequency distribution of these repeat examinees scaled scores is also presented below (Graph 2).

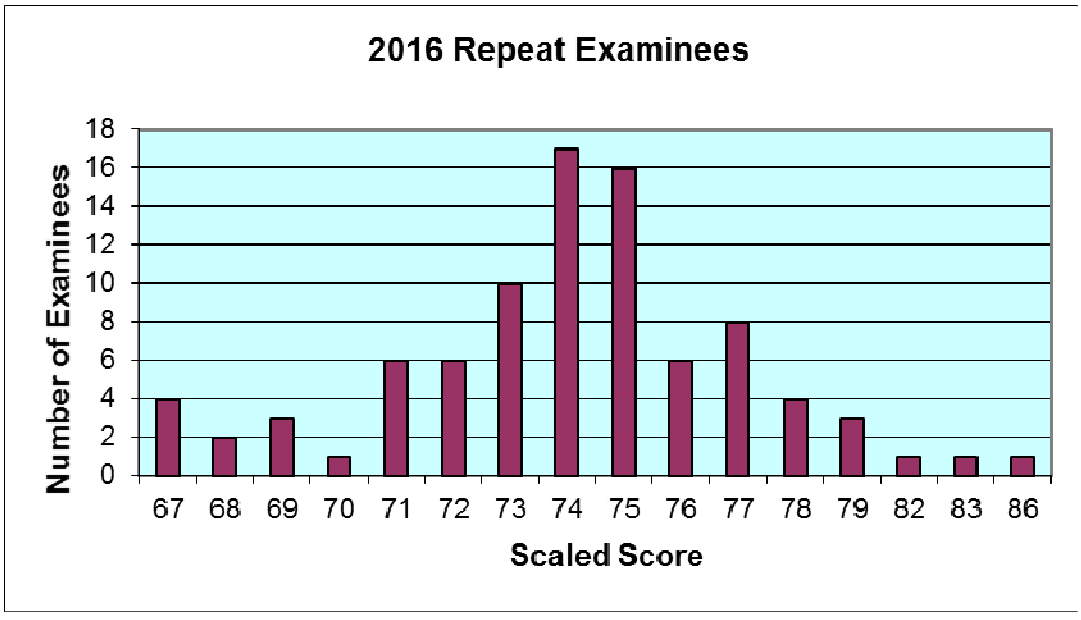
Total Number:	89	
Total Number Pass:	40	44.94%
Total Number Fail:	49	55.06%

Performance breakdown

Pass:	37	41.57%
Pass with Distinction:	2	2.25%
Pass with Highest Distinction:	1	1.12%
Fail:	49	55.06%

Range of Scores:	67 to 86
Average Score:	74.15
Standard Deviation:	3.35
Median scaled Score:	74

Graph 2. 2016 Repeat Examinees



Alternate Eligibility:

Seventy five (75) examinees qualified to sit for the examination through the Alternate Eligibility Pathway in 2016 (Table 6). A total of 54 out of 75 examinees (63.53 percent) passed the examination. Two examinees passed with highest distinction (2.67 percent). Five (5) examinees in this group passed the examination with distinction (6.67 percent). A frequency distribution of the alternate eligibility examinees is presented below (Graph 3).

Table 6: 2016 Alternate Eligibility Examinees

Alternate Eligibility Examinees

Total Number:	45	
Total Number Pass:	32	71.11%
Total Number Fail:	13	28.89%

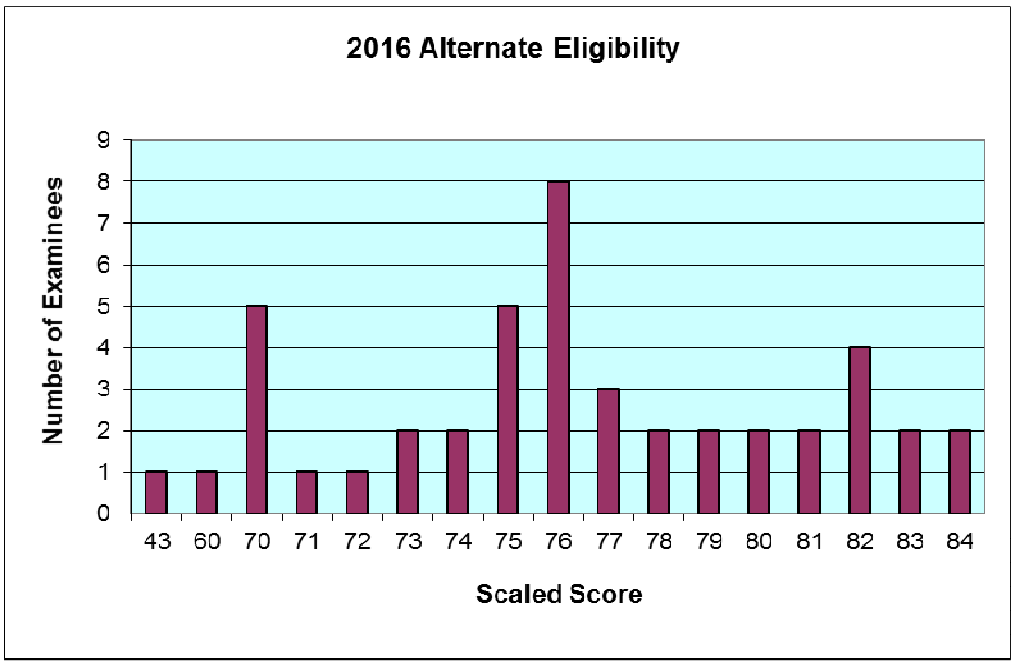
Performance Breakdown:

Pass:	24	53.33%
Pass with Distinction:	8	17.78%
Pass with Highest Distinction:	0	0.00%
Fail:	13	28.89%

Summary Statistics:

Range of Scores:	43 to 84
Average Score:	75.6
Standard Deviation:	6.86
Median scaled Score:	76

Graph 3. Alternate Eligibility Examinees



NMT Program Graduates - First Time Examinees:

A total of 685 out of 819 examinees (83.64 percent) were graduates of nuclear medicine technology training programs who took the examination for the first time (Table 7). A total of 609 out of 685 first-time examinees (88.9 percent) passed the examination in 2016. Of those, 1 examinee (.15 percent) passed the examination with highest distinction and 12 examinees (1.75 percent) passed the examination with distinction. Only 76 program graduate first-time examinees (11.1 percent) did not pass the examination in 2016. A frequency distribution of these first-time examinees is provided below (Graph 4).

Table 7. First Time Examinees

First-Timers (Nuclear Medicine Program Graduates)

Total Number:	685	
Total Number Pass:	609	88.90%
Total Number Fail:	76	11.10%

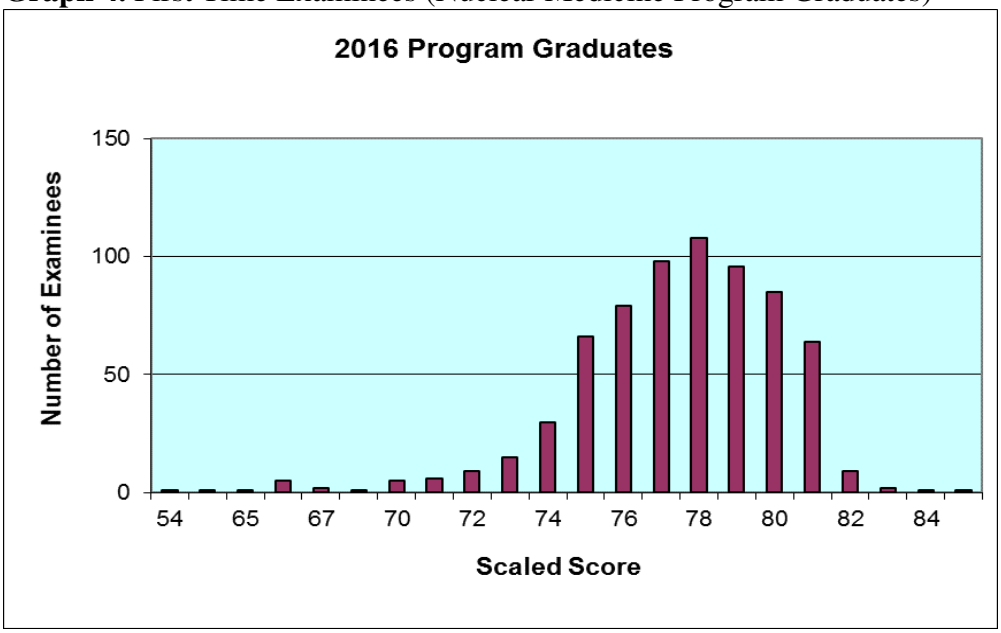
Performance Breakdown:

Pass:	596	87.00%
Pass with Distinction:	12	1.75%
Pass with Highest Distinction:	1	0.15%
Total Number Fail:	76	11.1%

Summary Statistics:

Range of Scores:	54 to 86
Average Score:	77.40
Standard Deviation:	2.96
Median scaled Score:	78

Graph 4. First Time Examinees (Nuclear Medicine Program Graduates)



Overall, the year 2016 was a successful year for both program directors and students of nuclear medicine technology programs. Of the 685 examinees who graduated from nuclear medicine technology training programs, 609 (88.9 percent) passed the examination in 2016.

As always, the NMTCB remains sensitive to the needs of the program directors and their students. The Board is committed to offering the premier certification program for nuclear medicine technologists. Please let us know if there is anything that should be included in future exam reports. We welcome your comments/suggestions.

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